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CHALLENGE

GDW's Magazine of Adventure Gaming

during one 5-second combat round. There are two ratings given. The one on the left side of the slash is for when the aircraft is fully loaded. The one on the right side of the slash is for when the aircraft is clean. Example, an aircraft has a loaded turn radius of 45°. In order for it to make a 180° turn, it would take four combat rounds. A Loaded aircraft is one that is carrying its full underwing stores capacity or its full cargo load. A clean aircraft is one that has dropped its underwing stores or is carrying less than 25% of its cargo capacity.

Acceleration is the amount by which an aircraft can increase or decrease its speed during a combat round.

ALTITUDE

Altitude determines at what range an aircraft will be spotted. This in turn determines how much time the people on the ground have to get ready for the incoming aircraft. For purposes of these rules, altitude levels are defined as follows:

Nap of the Earth (NOE) = up to 30m
Low Level = 31-600m
Medium Level = 601-3,500m
High Level = 3,501-20,000m

Aircraft flying at an altitude of more than 20,000 meters are considered to be too far up to have any effect on ground units.

DETECTION

Aircraft are spotted in one of two ways: electronically or visually. The following table gives the maximum detection range for radar (results are in kilometers).

DETECTION RANGE

Altitude	Max. Range
NOE	24
Low	74
Medium	177
High	427

This chart presumes ideal conditions on a flat surface. Very often terrain obstacles and bad weather will reduce these ranges considerably. The table is based on a radar set operating at ground level.

Spotting an aircraft on radar at NOE level is DIF:ELC task. Spotting an aircraft at low level is an AVG:ELC task. Spotting an aircraft at medium or high level is an ESY:ELC task. If the aircraft is using ECM, DM −20 for Soviet built-aircraft, −30 for Western-built aircraft.

Rather than go into a lengthy discussion of various makes of radars and their merits, the generalizations given below will be used. These reflect average performance of the various classes of radars.

RADARS

Type	Maximum Range
Portable Battlefield Radar	10 Km
Vehicle-Mtd Weapon Radar	20 Km
Ground-Based Search Radar	500 Km

Portable battlefield radars are usually towed on trailers or mounted on vehicles. Vehicle-mounted weapons radars are used as fire control systems on self-propelled antiaircraft vehicles like the ZSU-30-6 or the tracked rapier missile system. Ground-based radars are permanent or semi-permanent installations.

The maximum visual sighting range for a ground observer is 10 kilometers. This is without visual aids. Visually spotting an aircraft at NOE Level is DIF:RCN. Spotting an aircraft flying at low level is AVG:RCN. Spotting an aircraft flying at medium or high altitude levels is ESY:RCN. Characters will probably want to establish positions higher than ground level wherever possible. This will give them as much early warning as possible and allow them more time to react. To simulate the effect of added height, add one kilometer to the maximum visual sighting range for each meter that the observer is above ground level.

Another tactic that characters can use is to designate an air watch. The air watch is a character or characters whose only job is to watch for approaching aircraft. Usually each vehicle has at least one crewman or passenger on air watch. A character on air watch adds 20% to their rolls for spotting aircraft but they subtract 50% from their rolls for spotting ground targets.

Aircraft can spot ground targets. In order to do so, they must be at either low or medium altitude levels. The speed of the aircraft determines the difficulty level of the task. For aircraft moving at less than 200 kph the task is ESY:RCN, from 201 to 400 kph the task is AVG:RCN, and from 401 to 800 kph the task is DIF:RCN. Aircraft moving at speeds in excess of 800 kph cannot spot any ground target except for large formations of vehicles or men (6 or more vehicles or 100 or more men in column formation). They can also spot large clusters of buildings or medium or large installations in the open. This is an ESY:RCN task.

A man-sized target or small vehicle (5 tons or less) is spotted at double the normal encounter range. Vehicles larger than 5 tons are spotted at triple the encounter range. Fixed installations are spotted at four times the encounter range. Moving vehicles are spotted automatically at four times the encounter range.

Aircraft can spot each other while in the air. Aircraft at high altitudes can spot each other at 90 kilometers. Aircraft at lower

altitude levels can spot each other at 10 kilometers. The same difficulty levels for spotting ground targets apply.

AIR TO GROUND COMBAT

Aircraft can attack ground targets in a variety of ways with a number of different weapon systems. The weapons and the tactics for using them are covered below.

Iron Bombs: These are the bomb equivalent of plain vanilla. They have no homing devices or command guidance systems. They require a good deal of skill on the part of the pilot to deliver them accurately, since aircraft itself is the guidance system. They are, however, cheap and easy to produce.

Smart Bombs: These are bombs with a laser homing device in the nose and variable ballistic fins. They follow the same rules as cannon launched projectiles. The laser designator can be mounted in the aircraft itself, or can be with another aircraft or even a ground unit. Smart bombs are usually dropped singly or in pairs.

Retarded Bombs: These are bombs with air brakes that slow the rate of descent. This allows the aircraft dropping them more time to get clear of the blast radius.

Napalm: Napalm is made by mixing a petroleum based fuel with a thickening agent, white phosphorus and charcoal. The bomb itself has blunt ends and no fins. Napalm strikes are executed at low altitude levels. The flaming fuel is scattered over a wide radius, immolating anything it touches.

Glide Bombs: These are bombs with wings and some form of command guidance system. They are dropped from medium or high altitude levels out to a range of 50 kilometers from the target. Glide bombs travel at the rate of 1300 meters per combat round.

Air to Surface Missile (ASM): There are few of these still around in 2000. Those that are left are used against high priority targets. They are incredibly accurate weapons. Range and speed vary with missile type.

Both glide bombs and ASM's use either one of two types of guidance systems; semi active laser homing (SALH) or electro-optical homing (EOH) guidance. With SALH, a laser designator marks the target. A sensor in the nose of the weapon picks up the mark and locks the target location into the weapon's memory system. The weapon is then launched and flies along a straight line to the target. The launching aircraft can then leave the area.

An EOH system works differently. An electro-optical sensor is located in the nose of the weapon. This in turn is linked to a transmitter/receiver. A visual image of what the weapon "sees" is transmitted back to the aircraft. The weapon system operator then flies the weapon to the target by remote. The visual image allows him to make any necessary course corrections.

EOH systems require a second person be on board the aircraft as the Weapons Systems Officer. Most EOH guidance systems are used with air-to-surface-missiles, since the missile's speed cuts down the amount of time an ircraft must remain in the target zone.

Rockets: Rockets are area effect weapons. They are carried on launch rails or in pods. Rocket attacks are made at low level. Rockets are fired in pairs from each wing. This is done to prevent the aircraft from becoming unbalanced.

Guns: These are machine guns or small bore autocannon mounted on the aircraft. Attacking with these weapons is called strafing. Strafing runs are made at low or NOE altitude levels. Strafing runs are generally made as a last resort.

TACTICS

Aircraft have various means of delivering their weapons. These are described below.

Dive Bombing: Dive bombing is a very accurate (but very dangerous) method of hitting the target. The aircraft goes into a steep dive (30° to 45° angle) over or near the target, dives to low level, releases its' load and then pulls up. The bombs continue to the target, with a very high chance of hitting.

All dive bombing attacks must be made at low level. The pilot must make an AVG skill roll on the approach. A failure indicates that he failed to acquire the target and must abort the dive and make another approach. A catastrophic failure indicates a mechanical problem resulting in a loss of control of the aircraft (and subsequent impact with the ground).

After the approach is completed, the pilot drops his bombs. The formula for determining if a bomb hits is ESY:(HW + Pilots' Skill/2). Failure indicates that the pilot released too soon or too late and missed the target completely. For failures, the distance of the deviation is per the basic rules deviation diagram, with results of 4, 5, 6, or 8 being re-rolled. A catastrophic failure indicates that one or more of the bombs have gotten "hung up" and failed to release. This effects all subsequent skill rolls by increasing the difficulty level by one.

Once the bombs have been released, the pilot then makes an AVG vs Pilot skill roll for exiting the target area. Failure indicates that the aircraft was caught in the fringes of the bomb blast and takes 6D6 worth of hits. Use the "Other" column on the aircraft damage table. A catastrophic failure indicates that the pilot lost control and flew into an obstacle (or some similar event).

Low Angle Bombing: Low angle bombing is another method used for delivering bombs. In this tactic, the aircraft comes in at low level on a straight line to the target. The dive angle is much shallower than a dive bombing run, usually 10° to 15°. The bombs are released and the aircraft continues on its' way.

All low angle attacks must be made at low altitude. The pilot must make an AVG skill roll on the approach. A failure indicates that the pilot failed to acquire the target and must make another approach. Catastrophic failures are ignored.

After the approach is made, the pilot drops his bombs. The formula for determining if the bombs hit their target is AVG:(HW + Pilots' skill/2). Failure indicates that the pilot released too soon or too late and missed the target completely. For failures, the distance of the deviation is 1D10 × 30 meters. The direction is rolled for on the scatter diagram with results of 4, 5, 6, or 8 being re-rolled. As with dive bombing runs, a catastrophic failure indicates that one or more of the bombs have failed to release and the aircraft departs from controlled flight. The penalties are the same.

Once the bombs have been released, the pilot then makes an ESY roll for leaving the target area. Failure indicates that the aircraft was caught in the fringe of the blast and takes 6D6 worth of hits as in a dive bombing attack. A catastrophic failure has the same result as a catastrophic failure for dive bombing.

Level Bombing: Level bombing is a rarely used tactic. In this type of attack, the aircraft approaches the target at medium

altitude at an angle of 5° or less, drops its' bombs and continues on its' way.

All level bombing runs must be made at medium altitude level. The pilot must make an ESY skill roll on the approach. A failure indicates that the pilot failed to find the target area. A catastrophic failure indicates the pilot is completely lost.

After the approach is made, the pilot drops the bombs. The formula for determining accuracy is as follows: DIF:(HW + Pilots' skill/2). Failure indicates that the bombs have missed the target completely. The distance of deviation is 1D10 × 250 meters. The direction is rolled for normally on the scatter diagram. Catastrophic failure indicates that either the bombs are hung up in the rack (or cargo compartment) or that they've hit friendly positions. The referee should decide whatever is more appropriate.

Once the bombs have been released, exiting the target area requires an ESY skill roll. Level bombing attacks are the only kind of attacks that transport aircraft are allowed to make.

Aircraft usually drops more than one bomb during a run. They are dropped in multiples of two or more. This is called a stick. To determine the path of the stick, first calculate where the first bomb lands, taking into account deviation. The other bombs will fall in a line in front of this. The distance between bombs is 1D6 × 5 meters for a dive bombing or low angle attack and 1D10 × 10 meters for a level attack. It's possible to walk a stick of bombs onto the target.

Retarded bombs are often used in dive bombing or low angle attacks, because their slow rate of descent makes them more accurate. Add 20% to the skill roll for hitting the target during a dive bombing or low angle attack using retarded bombs. Aircraft using retarded bombs also have more time to escape from the target area before the bomb hits. This negates the effects of a regular failure while exiting the target area.

The formula for determining whether or not a stand-off weapon hits depends on the guidance system used. For Semi Active Laser Homing (SALH), a character must make an ESY: (HW + CMP/2) skill roll for the bomb or missile to the point indicated by the laser designator, it will automatically follow the laser spot. For Electro-Optical Homing (EOH), the formula for guiding the weapon to its' target is AVG:(HW + ELC + CMP/3).

In order to execute a napalm strike, the aircraft must make a low angle attack approach. Because of the shape of a napalm canister, all rolls to hit are made at −20%. Each napalm canister produces a 20 meter wide by 100 meter long "footprint". Any unarmored cargo vehicle caught in this footprint will automatically suffer 1D10 × 10% damage to its suspension system. A tracked AFV caught in the footprint will automatically suffer 1D10 × 1% damage to its' suspension system. In addition, any externally mounted equipment such as laser range finders, pintle mounted MGs, etc., will suffer 1D10 × 10% damage immediately. Characters caught in the footprint are treated as if they were exposed to a chemical blood agent (per

page 7 of the *referee's manual)* with the following exceptions:
—The character receives 2D6 hits to each area of his body (arms, legs, head, and so on).
—The character is considered exposed for 2D6 turns after he leaves the footprint, and cannot avoid injury by holding his breath.
—Gas masks and other NBC protective gear have no protective effects. Characters in radiologically shielded vehicles suffer half damage.

Strafing runs are carried out during dive bombing or low angle attacks. They may be in conjunction with any other attack. The formula is AVG: (HW + Pilots' Skill/2) if made alone. If made in conjunction with another form of attack, the difficulty level is increased by one. The range is considered to be short. The point of impact moves ahead of the aircraft for a distance equal to 10% of the aircraft's' current speed. The shots will strike anything in this path.

Rocket attacks are conducted during a low angle or dive bombing attack. The procedures are the same as outlined in the helicopter section of *The Free City of Krakow* module.

BOMB DAMAGE

Anything or anyone caught in the blast radius of a bomb takes full damage. Anything out to 2 times the blast radius takes 1/2 damage, out to 4 times the blast radius, 1/4 damage, and
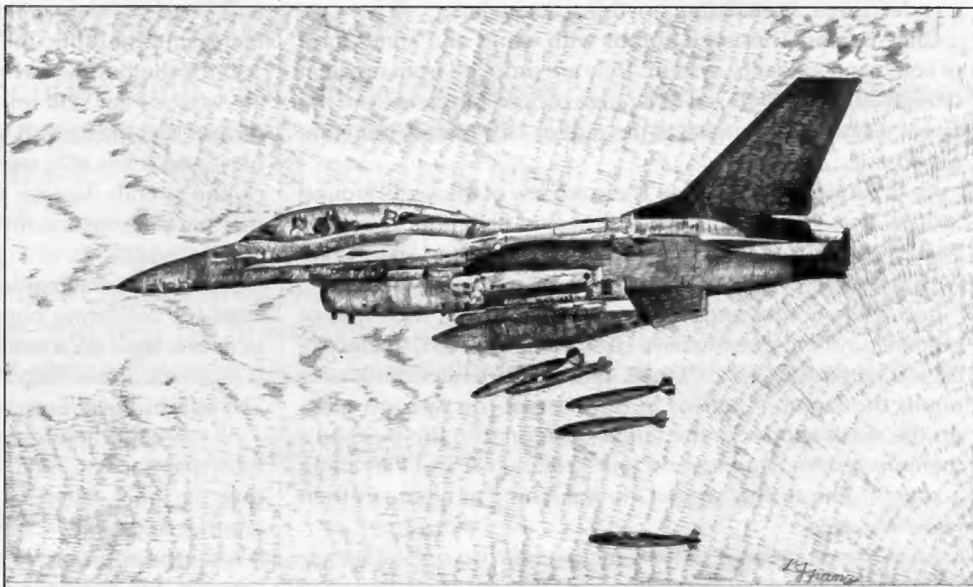
out to 8 times the blast radius, 1/10 the damage. Bombs have a knockdown radius (KDR) of 10 times their blast radius.

Fragmentation: Bombs also produce fragmentation damage. Inside the blast radius, targets have a 100% chance of being hit by fragments. Out to twice the blast radius, the chance is 80%. Out to 4 times the blast radius, the chance is 60%. Out to 8 times the blast radius, the chance is 20%. If a character rolls less than half the required number to hit, he suffers multiple hits: roll 1D6 to determine the total number of hits. Roll hit location separately for each hit.

The number of hits each fragment causes depends on the size of the bomb and how far away the target is from the blast radius. The number of hits is as follows: Inside the blast radius, full frag damage. Out to twice the blast radius, 1/2 damage. Out to four times the blast radius, 1/4 damage. Out to eight

1/10 damage. All fragments have an armor multiplier of ×2.

Fragments from white phosphorus and thermite bombs are burning particles that will cause burn damage. Instead of the above procedure, each fragment inflicts $1D6 \times 6$ hits out to twice the blast radius. Incendiary fragments have an armor multiplier of ×10.

Contact Damage: Contact damage is the damage resulting from a direct hit by the bomb. It is resolved in the same way as damage from a hit by a non-explosive round.

Cluster Bomb Units: Cluster bomb units (CBU) are treated in the same manner as ICM, per page 6 of the *referees manual*.

FIRING AT AIRCRAFT

Firing at aircraft is conducted in the same way as firing at most other vehicles. Any weapon can fire at an aircraft. Any aircraft flying NOE is assumed to be partially obscured (see the *target obscured* rule on page 21 of the *play manual*). Aircraft making dive bombing, low angle, or level bombing attacks are not considered partially obscured.

RF: Only anti-aircraft weapons systems may use their RF against aircraft. No other RF applies.

Heat Seeking SAMs: The rules for using heat seeking surface-to-air missiles are the same as on page 40 of *The Free City of Krakow*.

SALH SAMs: The target aircraft is painted with a laser designator. The SAM has a laser designator to the target. The laser must be kept on the target until the missile hits. Using an SALH requires an AVG:HW skill roll.

SARH SAMs: The target aircraft is painted with a radar beam. The SAM homes in on the radar signature. Should the target aircraft fly out of the radar cone, the missile automatically misses. Firing an SARH missile requires an AVG:(ELC + HW/2) skill roll.

Semi Active Command Line of Sight SAMs: The target aircraft is visually sighted through a rangefinder. The missile is launched, and the gunner must keep the aircraft in the crosshairs of the rangefinder until the missile hits. Course corrections are broadcast to the missile by radio. Firing a SACLOS missile requires an AVG:(ELC + HW/2) skill roll.

SAMs can acquire and lock on a target in one combat round. This is a task, (ESY:HW).

Hyper Velocity Rocket Systems: An HVRS works like a giant shotgun. A number of unguided rockets are fired into the aircraft's flight path. To lock on to a target is a task, AVG:(ELC + HW/2). For each rocket fired there is a 5% cumulative chance of scoring a hit on the target aircraft. The base hit number is calculated in the same way as for other direct fire weapons. For every 10% that the number is made by, one hit is scored on the target aircraft. All fractions are rounded down. Example, A character is prepared to fire an HV rocket pod at an Su-25 that is attacking his position. He has HW of 70 and an ELC of 50. Using the formula, we find that his chance to acquire the target is 60%. He rolls a 34 and acquires the target. He then fires a full salvo of rockets (19) at close range. Multiplying 19×5 gives us a base change of 95. Using the multiplier for close range (.6), we multiply $95 \times .6$ for a final result of 57. The character rolls a 36, scoring 2 hits on the Su-25.

The statistics on the US 2.75" and Soviet 57mm Rocket Pods are given on page 41 of *The Free City of Krakow*.

Agility: Among other things, agility indicates an aircraft's ability to "jink," that is, to make small lateral movements to throw off a gunner's aim. To simulate this, multiply the aircraft's current agility by 3. The result is used as a negative modifier to all fire directed against it. If the aircraft jinks during its' attack run, the modifier is applied against all rolls made by the pilot for approach, ordnance release, and exit rolls. Jinking is generally used when approaching or exiting the target area.

COMPONENT AND PERSONNEL DAMAGE

After the aircraft has been hit, refer to the appropriate hit location chart provided with this article, depending on what part of the aircraft has been hit. Then refer to the appropriate damage location chart. Each damage location chart is set up to reflect a basic type of aircraft configuration. Components and personnel associated with a particular location in the aircraft are listed in random order. The referee should roll once per component or occupant in the damaged section in any order he wishes.

Wing and Tail Damage: Damage to wings and tail of an aircraft cause a cumulative reduction in speed and maneuverability. For each 10% damage an aircraft takes to these areas, reduce all speeds by 10% and reduce agility by 1 point. The percent damage to the tail or wings is the percentage chance the aircraft has of going out of control and crashing. This is checked every combat turn. For example: An aircraft has 9% damage done to its' right wing, 4% damage to its' left wing and 8% damage to its' tail, therefore, it has a cumulative 21% chance of crashing each combat turn. For extended flights (limping back to base), this need only be checked once per hour of flight and again just before landing.

Engine Damage: If an aircraft's engine is damaged, it will lose power and lift, and be less able to fly. Engines that suffer more than 10% are considered to have become non-functioning. For twin engine aircraft, each engine lost will reduce all performance by 60%. For four engine aircraft, the percentage is 30% per engine lost.

Pylon Damage: Pylon damage is handled the same as for helicopters using the rules on page 40, of *The Free City of Krakow*.

Crashes: Aircraft crashes are handled the same as helicopter crashes. Use the rules on page 41 of *The Free City of Krakow*.

Bailing Out: Characters in a damaged aircraft may wish to parachute to safety. To bail out of an aircraft without an ejection seat is a task, AVG:(AGL + PAR/2). Using an ejection seat reduces the difficulty by one level (all of this assumes the character has a parachute).

AIRCRAFT HIT LOCATION CHART

Die	Front	Rear	Other
1	FF	RF	FF
2	FF	RF	FF
3	FF	RF	CF
4	FF	V	CF
5	FF	V	V
6	FF	V	V
7	FF	CF	RF
8	V	CF	RF
9	V	CF	V
10	V	V	V

FF = front fuselage, CF = Central Fuselage, RF = Rear fuselage, V = Wing, J = Tail.

DAMAGE CHART A

FF: E, C, R, N, D
CF: S, P, F, W
RF: S, P, J
V : M

DAMAGE CHART B

FF: C, R, N, D
CF: S, P, F, W
RF: S, P, J
V : E, F

Radar, all weather avionics 1 × CF pylon: 1000 kg, 2 × inboard wing pylons at 2000 kg each, 2 × center underwing pylons at 1500 kg each, 2 × outboard wing pylons at 300 kg each, and 2 × wingtip pylons at 200 kg each. **Price:** $5,000,000 (R/R) **RF:** + 40 **IR:** + 40 **Armament:** 20mm Autocannon **Ammo:** 170 × 20mm **Tr Mov:** 2074 **Com Mov:** 1285 **Agility:** 10/5 **Turn Radius:** 100/50 **Acc:** 1285 **Fuel Cap:** 3162 **Fuel Cons:** 2875 **Wt:** 7 tons **TO Run:** 2000 m **Land Run:** 1500 m **Cargo:** none **Load:** 5400 kg **Mnt:** 40 **Crew:** 1 **Armor:** FF(?)

Cargo: *A Merchant Prince Variant*

Although **Traveller**'s new *Merchant Prince* trade system introduces a more sophisticated method for merchant characters to earn profits, it does not include identification of the specific nature of cargoes available for interstellar trade. This article is a look at what might be available on various types of worlds, along with some simple rules and tables to be used to enhance the *Merchant Prince* system. These will add color to any campaign.
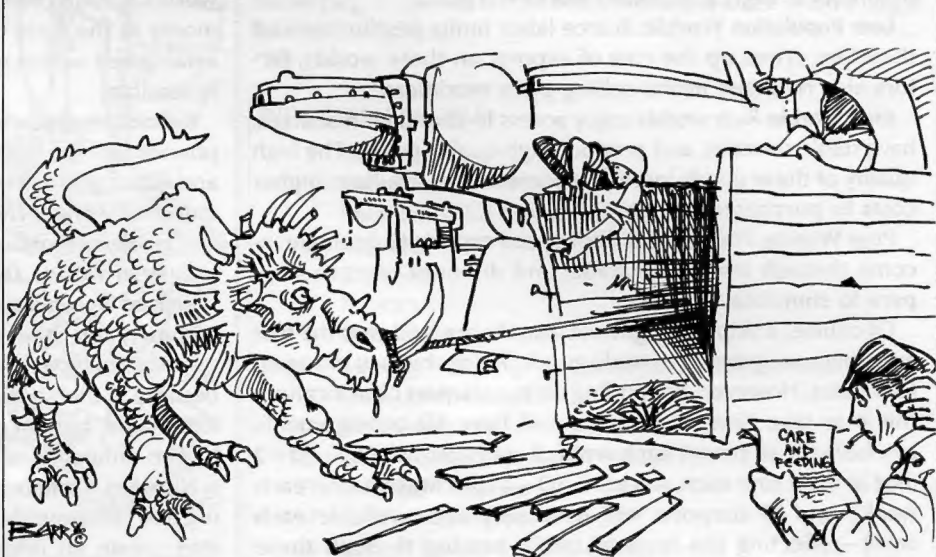
In addition, this material will help make trade more of an adventure and less of a bookkeeping exercise. It may also affect how characters act in an adverse campaign situation.

As an example, a skipper of a free trader carrying a load of high explosives will be far less likely to stand and fight a suspected pirate than the captain of a freighter carrying steel scrap. Other cargoes, such as a load of live aquatic food animals shipped as zoological specimens, will require special fittings aboard ship, and careful handling and constant monitoring by crew members. Now, with a few extra die rolls, a cargo becomes more than a string of digits recorded in a ship's log—it becomes an active part of the adventure. This is my expansion of the *Small Cargo* articles which appear occasionally in this magazine.

WORLDS

From the trade and commerce standpoint, there are three basic types of worlds in the **Traveller** universe. These are *resource worlds, agricultural worlds,* and *industrial worlds.* The latter two have been discussed extensively in **Traveller** rules. The first type includes several previously listed trade classifications in *Merchant Prince.*

Resource Worlds: These are the most numerous, and are most commonly found listed as "non-industrial", that is, lacking extensive heavy industry. They may also be barren worlds, vacuum worlds, fluid ocean worlds, desert worlds, ice-capped worlds, or water worlds. They have one thing in common: a medium to low population busily engaged in exploiting the world's natural resources and shipping them to other markets. These worlds are the sources of the universe's metals, radioactives, hydrocarbons, feedstocks, fuel, and (where appropriate) forest products and other organic raw materials. Note that there are *non-industrial worlds* which are not exploited for their resources. These can be research station sites, or they may be used for government purposes (Imperial or otherwise) or be interdicted for various reasons.

Agricultural Worlds: These worlds are the breadbaskets of the universe. They are rich in organic food, fiber and pharmaceutical products, and have a surplus ready to export to worlds with none or little indigenous natural food production.

Industrial Worlds: The mainstay of any modern interstellar society, these take the raw materials from the resource worlds and convert them into finished goods. This is done with labor-intensive methods on moderate tech level worlds, or with technology-intensive processes such as automated refineries and factories on higher tech level worlds.

PROCEDURE

To determine what goods are available for purchase on a particular world, roll 2D on one of the cargo tables included with his article before computing the purchase cost. Check the cargo commentary section beneath each table to make sure your ship is prepared to cope with any hazards the available trade goods may bring aboard. If you still wish to purchase the indicated trade goods, then proceed as outlined in *Merchant Prince.*

There are tables included for each of the three major trade types, as well as for several other trade classifications. Be sure to check for die roll modifiers caused by other world characteristics such as tech level or population. In addition, several specialized trade goods tables are included for water worlds, desert worlds, fluid ocean worlds, vacuum worlds and asteroid belts. Either the appropriate specialized table or a major trade classification table may be used when determining the available trade goods if the selling world has more than one characteristic, such as water world, agricultural; or fluid ocean, industrial.

Finally, there is a general cargo table designed to be used by skippers calling at worlds that don't fit into any of the above categories, including the rare unclassified planets.

Not all world classifications will generate specific types of cargoes. Their effect on trade and commerce will be more indirect. These include:

Non-agricultural Worlds: Since this classification indicates a lack of a type of trade good, this will only affect the market price paid for the sale of agricultural commodities.

High Population Worlds: Labor costs are

lower on these worlds because of their large labor pools. These worlds earn income and trade goods by exporting a high volume of goods. These factors are reflected in the selling price modifiers at high population world starports.

Low Population Worlds: Scarce labor limits production and therefore drives up the cost of exports on these worlds, factors also reflected in the selling price modifiers.

Rich Worlds: Rich worlds enjoy access to abundant resources, have stable societies, and produce high-quality goods. The high quality of these goods increases demand and results in higher costs to purchasers.

Poor Worlds: Poor worlds badly need exports to generate income through interstellar trade, and discount costs to shippers to stimulate business.

Of course, a skipper might not want to buy and ship the first available consignment of trade goods. He or she may roll again for others. However, depending on the starport classification, this may take time. A starports will have 1D consignments available for shipment each week, B starports will have 1D − 2 (but at least one each week), C 1D − 4 (but at least one each week), and D starports will have only one available each week—reflecting the level of traffic passing through these facilities. E and X starports will have only one consignment available every 1D weeks, if the first is refused.

Cargoes may be shipped in one of three ways: in bulk, with no maximum or minimum tonnages, in standard cargo containers of 10 tons each, and as single units with specific tonnages, such as a single vehicle. The notes included with each cargo table specifies shipment method when necessary.

RESOURCE WORLD	
2	Processed Radioactives
3	Refined Ferrous Metals
4	Refined Hydrocarbons
5	Refined Non-ferrous Metals
6	Refined Ferrous Metals
7	Forest Products
8	Nitrogen Compounds
9	Crystals
10	Refined Radioactives
11	Refined Precious Metals
12	Refined Rare Earths

Resource worlds are generally listed as non-industrial. However, they may be vacuum worlds, asteroid belts, barren worlds, water worlds, and fluid ocean worlds. If a world is listed as both non-industrial, and one of the latter categories, the referee has the option of rolling on the above table, or one of the following specialized tables.

Barren worlds have no separate tables. Cargoes from these planets are rolled on the resource world table. However, they are shipped in bulk and in crude form without processing or refinement.

Processed Radioactives: These include radioactive isotopes including tritium, refined plutonium or other transuranic elements. These are highly radioactive and must be shipped in sealed radiation-proof containers. These containers, although designed for safety, may be breached by accident or combat (12 on 2D if a ship carrying radioactives sustains a "hold" hit). If this occurs, crew members exposed to the radiation suffer radiation sickness, taking 1 point of damage per day for the next two weeks for each 10 minutes spent in the cargo hold.

Refined Ferrous Metals: Steel and steel alloys shipped in crude form to another world for further processing and use. This is

the most common way resource worlds are exploited. Refineries are established after exploitable ore bodies are discovered, so that usable metals, not rock, is hauled between worlds. Crude ore shipped from barren worlds is most commonly in the form of assay samples shipped for analysis on established worlds to determine if exploitation is economically feasible.

Refined Hydrocarbons: These are polymers and other compounds derived from organic hydrocarbons, as well as coal tars and other petrochemicals that may be further processed on industrial worlds. They may be flammable and/or explosive and are usually poisonous. See the "chemicals" commentary in the industrial worlds section.

Refined Non-Ferrous Metals: Aluminum, titanium, magnesium, mercury, and other non-iron metals shipped in refined form.

Forest Products: Unusual or rare woods, used on other worlds because of their beauty and/or other qualities. These are usually flammable, but not explosive. Roll again if the resource world has an atmosphere less than *thin*.

Nitrogen Compounds: Unusual or rare organic and/or inorganic compounds prized as fertilizers. Organic compounds may create an odor problem aboard ship. Inorganic compounds such as ammonium nitrate may be explosive.

Crystals: These may be diamonds or similar precious stones. Alternatively, they may be quartz-like crystals needed by the electronics or gravitics industry off-planet because of their properties or structure.

Refined Radioactives: These are crudely refined uranium, thorium and plutonium. Although less dangerous than processed radioactives, these also must be handled with care.

Refined Precious Metals: Gold, silver, platinum, iridium. Tempting targets to criminally-oriented competition (i.e., hijackers).

Refined Rare Earths: These include molybdenum, yttrium, ytterbium, niobium, and others used in metal alloys; and, of course, the rare and precious lanthanum used in jump coils.

AGRICULTURAL WORLD	
2	Livestock
3	Fiber
4	Meat
5	Vegetables
6	Grain
7	Grain
8	Fruit
9	Meat
10	Herbs
11	Processed Food
12	Pharmaceutical Feedstocks

Livestock: These will generally be medium-sized to large herbivore grazers. They may be riding beasts specially bred for racing or food animals. Specific animals should be generated either on the shipping worlds's specific animal encounter tables or from the appropriate table for the world in Supplement 2, *Animal Encounters.*

The animal's size will be needed to determine how many of them can be shipped, and to determine if special handling is needed for amphibious or other characteristics. Often, a local animal handler may need to be hired as a supercargo to tend the livestock until they can be sold off-planet. Food (sometimes native plant materials, sometimes synthetics or substitutes) will need to be carried for the animal as well. Most animals will also need water, but this can be taken from the ship's recycling systems without difficulty in most cases. Allow three percent of body weight per day for food. As an example, a 1000 kg animal will require a total of 30 kg per day or 210
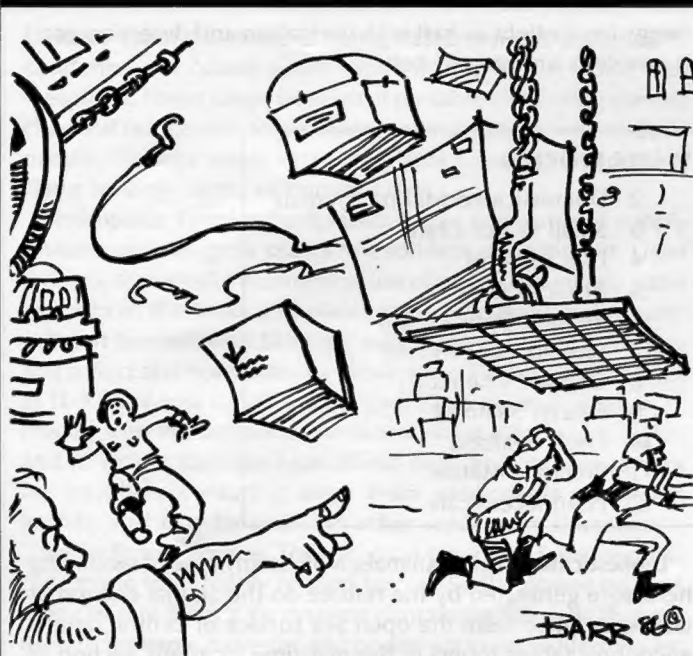
kgs for a J-1 trip. Exceptionally large animals may overload the ship's water system, and necessitate temporary augmentation of it.

Fiber: Animal or vegetable fibers shipped in 50 kilogram bales, usually loaded inside standard cargo containers. These unprocessed textile raw materials may be flammable, and may cause allergic reactions to crew members if the containers are broached.

Meat: Meat must be stored in a refrigerated cargo hold or container. A power failure aboard ship lasting more than 2D hours, or a long delay in transit, may result in spoilage (which will make the goods unsaleable).

Vegetables: Vegetables are also perishable. They must be delivered quickly to market and shipped in a chilled environment. Most have a narrow temperature range; freezing temperatures will destroy them as readily as warm temperatures will.

Grain: Grain is usually shipped aboard large bulk carriers, although odd lots are usually available for smaller shippers. All grain is shipped in bulk, and must be hauled in a cargo hold that has been devoted entirely to grain, and that has a protective liner. Grain dust is explosive and can be ignited by static electricity or other sparks (ask any farmer). Cargo hold air should be continually filtered to guard against a potential dust-explosion.

Fruit: Fruit must be handled similar to vegetables. Many, however, are more delicate and require more exact temperature controls to avoid damage.

Herbs: These are spices, teas, and mild narcotics to be either drunk as decoctions or smoked. They will usually be shipped in standard cargo containers. Shipments of baled herbs may be encountered and should be considered a fire hazard.

Processed Food (Roll 1D to determine exact type): 1-2 = A milled grain product such as flour shipped in bulk. 3-4 = Packaged food, may be frozen or freeze-dried. 5 = Wines, usually only high value, rare vintages will be shipped among worlds. 6 = Liquors, which may be a target for pilfering or hijacking.

Pharmaceutical Feedstocks: These are the base material from which drugs are sometimes manufactured, and can range from dried vegetable matter to frozen animal glands. These are high value cargoes prized on the black market, and are often a target of theft or piracy.

<div style="border:1px solid">

INDUSTRIAL WORLD
2 Chemicals
3 Weapons
4 Semi-Finished Metal Products
5 Vehicles
6 Clothing
7 Plastics
8 Electronics
9 Mining, Farming, or Construction Equipment
10 Consumer Goods
11 Machinery
12 Grav Vehicles or Small Spacecraft
13 Medical Supplies
14 Gravitic Components
15 Fusion Power System Components
16 Cybernetics
DM +4 if shipping world TL10+
</div>

Chemicals: These can range from explosives and corrosive acids to ordinary fertilizers. Roll 1D for the exact nature of the trade goods: 1-2 = Explosives, 3-4 = Corrosives, 5-6 = no Special Characteristics. Explosives need to be kept free of shock or excessive temperatures. Roll 14+ for an explosive cargo to detonate by accident during loading or shipment; DM +2 if temperature at starport is greater than 30ºC, DM +6 if ship is hit by laser fire during combat, DM +8 if ship is hit by missile fire. A cargo explosion would destroy the ship and kill the crew. An accidental spill of corrosive chemicals could inflict 3D injury points on a crew member (roll 1-2 on 1D), damage the ship's control or electrical cabling (3-5), or, in an extreme case, breach the hull (6).

Weapons: A consignment may consist of any individual weapon ranging from daggers to fusion guns listed in basic **Traveller** or Book 4, *Mercenary* as long as it does not exceed the tech level of the shipping world. A weapons shipment may cause trouble with planetary authorities during an attempt to sell the trade goods, depending on the local law level and political situation. It may also be a target for theft and piracy. It could also command a premium price on the black market.

Semi-Finished Metal Products: Metal sheets, beams, piping, or forms to be used either as construction material or finished into a final product such as a ship's hull or ground car body.

Vehicles: Roll 1D: 1-3 = Ground Vehicles, 4-5 = Air Vehicles, 6 = Watercraft. Trade goods may either be the indicated vehicle, or spare parts for the vehicle (referee's option). The referee must select the specific vehicle type from **Traveller** equipment lists to determine the tonnage of the shipment.

Clothing: Clothing is generally shipped in closed cargo containers, and is usually considered a low-value cargo. However, consignments may consist of valuable *haute couture* originals, clothing and shoes made of rare leathers or furs.

Plastics: Plastics products could include plastic feedstock

being shipped in bulk, household items made of plastics, including toys, or plastic parts being shipped for assembly into finished goods. They may be flammable (throw 8+ on 2D) or could emit toxic fumes at high temperatures (7+ on 2D).

Electronics: Electronics consignments will most likely consist of small computers, communications gear or entertainment equipment. Sometimes, they may consist of detection equipment. Often, electronics equipment will have military applications.

Mining, Farming, or Construction Equipment: These are heavy, self-propelled implements such as farm tractors, bulldozers, drilling rigs, or heavy trucks. Most will be wheeled or tracked, although grav trucks may be shipped as well. The minimum mass for this cargo is 10 tons per unit in the consignment.

Consumer Goods: This is a consignment of household appliances and furniture shipped in standard cargo containers.

Machinery: A machinery shipment can range from drill presses and other manufacturing equipment to artificial food synthesizers, and can include engines, production line equipment, and ore processing systems.

Grav Vehicles or Small Craft: These consignments can consist of spacecraft (roll 5-6) up to 100 tons displacement.

Medical Supplies: This may consist of anything from surgical instruments or drugs to a fully-equipped mobile field hospital.

Gravitic Components: These are spare antigravity modules for grav vehicles as well as spare parts for gravitic control circuits.

Fusion Power Systems: These are equivalent to starship power plants, but designed for use on worlds as power sources for industrial and civil applications. The minimum mass per system is four tons. Newly manufactured systems are shipped "cold" and pose no danger from radiation. However, rebuilt systems from worlds without stringent safety controls may contain residual radiation and could cause radiation sickness to ship's crew and passengers if not properly shielded.

Cybernetics: These are either consignments of powerful "mainframe" computers (roll 1-4 on 1D) or in some cases robotic components (5-6).

VACUUM WORLDS & ASTEROID BELTS	
2	Small Craft
3	Explosives
4	Frozen Gases
5	Semi-Refined Minerals
6	Vehicles
7	Vacc Suits
8	Pressure Tents
9	Mining Lasers
10	Vacuum Processed Parts
11	Vacuum Distilled Chemicals
12	Small Craft

Frozen Gases: Rare gases needed for industrial processes and products such as the inert gases xenon, krypton, argon, and neon. These are very dangerous if warmed, and must be shipped in special insulated and pressure-tight containers.

Semi-Refined Minerals: Roll on resource world table to determine exact consignment. Reroll if result is processed radioactives or forest products.

Vehicles: ATVs if source is a vacuum world, prospecting buggy (an air-tight air/raft with navigation and detection gear) if source is an asteroid belt.

WATER WORLDS	
2	Domesticated Marine Animals
3	Small Water Craft
4	Live Seafood
5	Artificial Gills
6	Refined Light Metals
7	Protein Concentrate
8	Organic Chemicals
9	Frozen Seafood
10	Fresh Seafood
11	Precious Metals
12	Pharmaceuticals

Domesticated Marine Animals: May be any type of swimming herbivore generated by the referee on the animal encounter tables, or taken from the open sea surface or central depths encounter tables found in the maritime locations section of Supplement 2, *Animal Encounters.* Holding tanks, available in 10 ton modules, must be purchased and installed before the cargo is loaded. Each 10-ton module costs Cr100 new, and from 50 to 90 percent of this price used. Used containers may leak while in flight, however, killing the contents.

Water Craft: Roll 1D. On 1-2, the consignment is a 500-ton submersible; on 3-4, an eight-ton hovercraft, on 5-6, a 60-ton high performance hydrofoil-equipped motorboat.

Live Seafood: Marine animals which are carried alive in tanks installed in the cargo hold. They may be any type of swimmer generated on the animal encounter tables mentioned above. Some may have limited air breathing capabilities and locomotion devices such as tentacles or legs which would enable them to escape from an unsecured tank during flight.

Refined Light Metals: These are refined smelted light metals such as magnesium, aluminum, lithium, and manganese which have either been extracted from seawater or mined as nodules on the seabed.

Protein Concentrate: Protein concentrate processed from marine life. A staple food product widely used on non-agricultural and industrial worlds. Most protein concentrates re-sold in bland-tasting (but nutritious) compressed cakes.

Organic Chemicals: These are chemicals extracted from marine life and used as fertilizers, explosives, or for other uses.

Precious Metals: Gold, silver, or platinum from sea water.

DESERT WORLDS	
2	Water Vapor Condensers
3	Hydroponic Farming Equipment
4	Desert Survival Suits
5	Computer Chips
6	Stellar Power Systems
7	Synthetic Food Systems
8	All Terrain Vehicles
9	Resource World
10	Computer Chips
11	Desert Survival Suits
12	Water Vapor Condensers

Water Vapor Condensers: Refrigerated systems designed to condense and collect water vapor from a desert world's atmosphere. These range from small portable units using canned chemical refrigerants to provide a water supply for one to three people, to large water recovery plants capable of supplying water to large farms or communities.

Hydroponic Farming Equipment: Tanks and nutrient supply systems used to grow plants in a soil-less environment. Used indoors, these make economical use of water, and enable water vapor from the tanks and plants to be recovered and reused.

Desert Survival Suits: Skintight suits that prevent moisture loss and collect and hold water for drinking and other use. Available at TL-9, they cost Cr500 and weigh 2 kg. A thermal cloak is included with the suit for protection against cold desert nights and to reflect daytime heat. These suits are vital equipment for travellers venturing away from settlements on desert worlds, and may be useful in other wilderness situations.

Stellar Power Systems: These consist of arrays of photovoltaic cells made from highly refined silicon. Stellar power systems range in size from 2 kg systems containing 100 cells that are used to recharge batteries and power packs on wilderness expeditions, to massive orbiting arrays that beam power to world surfaces. They are also mounted on starship hulls and used as emergency power sources.

Synthetic Food Systems: Nutrient tanks, culture vats, pumps, and piping used to generate synthetic food from genetically engineered yeast cells.

Resource World: Roll on the resource world table for cargo information. Reroll if the result is "forest products."

All Terrain Vehicles: Same as standard ATVs, except these include a 1000-cell, 20 kg photoelectric power system capable of either powering the vehicle during daylight on worlds orbiting a class K5 or hotter star, or recharging the ATV's on-board batteries for night-time travel. Twelve hours of continuous light from the planetary system's primary star will charge the batteries for 1000 km of travel.

FLUID OCEAN WORLDS	
1	Refined Hydrocarbons
2	Nitrogen Compounds
3	Exotic Chemicals
4	Resource Worlds
5	Nitrogen Compounds
6	Petrochemicals

Nitrogen Compounds: These are compounds refined from ammonia and used as fertilizers, pharmaceuticals, and explosives. These are dangerous to handle (treat as explosives).

Exotic Chemicals: Fluid ocean worlds are often extremely cold and under high atmospheric pressure. Exotic chemicals such as liquid helium II would result in such an environment. These chemicals may be extremely corrosive and/or difficult to handle.

Petrochemicals: These include plastics feedstocks, lubricants, pharmaceuticals, and polymers.

ICE-CAPPED WORLDS

Use vacuum world or resource world tables for cargo generation. Re-roll if forest products result. Ice-capped worlds will have no more than a trace atmosphere.

GENERAL CARGO	
1	Agricultural
2	Industrial
3	Resource
4	Agricultural
5	Industrial
6	Resource

Most inhabited worlds will have some type of cargo available, even if they are transhipments from another world waiting for an outgoing vessel. The general cargo table reflects this diversity, and is useful on any world, especially those with no trade classification. Roll 1D to determine type of cargo available. Then roll again for a specific cargo on the indicated world-type table.

—*Terrence R. McInnes*

Striker Weapon Systems Revisited

My previous article on *Striker* (*Journal of the Travellers' Aid Society* 21) studied the design systems for equipment in Book 3. This article will discuss the advantages and disadvantages in the use and organization of equipment that is already designed in Book 3 (mostly infantry equipment).

When considering infantry weapons, one must remember that there are two important statistics in infantry combat: penetration and accuracy. For example, if your unit has mostly assault rifles with effective penetration of 3, and your enemy has cloth armor with an armor value of 7, you will probably take heavy losses in any engagement while only wounding a few of them.

Accuracy is just as important, particularly when attacking an enemy in prepared positions. If the enemy is shooting from partial cover, you have to get at least two hits in order to have any effect (round half hits down, remember?). The −4 DM for infantry movement (charging the positions) doesn't help either. The problem is that after tech level 7, there is no weapon with sufficient penetration to keep up with the armor that still has an autofire bonus. You can't do much about it at tech level 7, but you should try to mix auto rifles and light assault guns (LAGs) at tech 8-9, ACR's and lasers at tech 10-11, and gauss rifles with energy weapons at tech 12 and above. This mixing prevents your unit from being trapped in a helpless situation. Also try to arm the higher

quality troops on the stand with the weapons without hit bonuses. When picking weapons, don't forget to have a decent range on your weapons; a squad of troops with submachineguns might be nasty at close range (on board a starship or in a forest), but they would be cut down in most situations by riflemen who could "stand-off" (another military term for your dictionaries) out of their range. The range question has also been a problem when deciding between the semi-auto rifle and the assault rifle (jamming rifles were not the only reason that some soldiers in Vietnam wished for the old M14 rifle over their M16's). Range should also make you think twice about using laser or energy weapons as general issue weapons.

Support weapons are usually designated as such because of their large weight and/or crew sizes. Support weapons can be machineguns, missile launchers, recoilless rifles, or even grenade launchers. Machineguns are good casualty-producing weapons against infantry, but at tech 7 and above, body armor reduces their effectiveness—that is, if the enemy has such armor. In this case, grenade launchers usually supersede other weapons, often in the role as individual weapons (contact hits from HE rounds usually kill, and the frag hit may wound another trooper on the stand). Recoilless rifles are an excellent mix of long-range infantry weapons, causing damage in a manner similar to a grenade launcher, and

anti-tank weapons. However, once composite armor comes into being, their anti-tank effectiveness is limited to killing APC's. The recoilless rifle is a weapon that has no hit bonus, and so requires a high-troop quality gunner.

When providing your infantry units with an anti-tank capability, a few HEAT rifle grenades are nice, but never depend on these. An infantry AT weapon should have good range, good penetration, and good accuracy—in that order. What use are rifle grenades when you can't get within the 250m effective range to use them? The best AT weapons are package AT missiles. Use target designated guidance and a laser carbine if weight allows—the assured hits are worth the extra cost.

Other weapons in the back of Book 3 include hand grenades (steer clear of these except in special situations—their range is terrible), bombs (very nasty—especially CBM types), nuclear warheads (we all know how good these are), body armor (this is always worth the extra cost, particularly if your opponent isn't expecting it), melee weapons (these are not worth the extra weight—just plan to use your rifles as cudgels; that is if you ever get that close), and communication/detection devices.

Commo/detection devices are very important to the game. However, the player must keep in mind that no system is perfect, and no countermeasure is perfect either. Let us first discuss detection devices. Radar is best used at tech levels 8 and below, but once ladar becomes efficient, use it to keep yourself from being open to jamming. No indirect fire unit should be without counter-battery radar of at least 10 power—unless the enemy is known not to have indirect capability (a serious tactical error). Thermal imaging is an expensive option for tech levels 8-9, but is very much worth it—maybe even for use on APC's. At about tech level 10, the cost of fusion tanks drops enough to allow them to carry extensive ECM without a great addition to the cost, and infantry can use

chameleon combat environment suits—making thermal imaging useless. At this point, image enhancement should supersede it, supplemented by light amplification and ladar for the half-decent night and limited visibility fighting ability. One note: all-weather radar costs 50% more than a normal radar, but if you were to buy a radar of double the needed power (100% more than a normal radar, 33% more cost than an all-weather radar), you would have the same limited-visibility capability, but the double power radar would be superior in normal use. For infantry, all stands should have light amplification when it becomes available, but IR devices are too short-ranged for general use. A better option is to put active IR scopes on the support/heavier weapons. Of course, once combat and power armor come into being, it becomes cost-efficient to put image enhancement and even low-power radars on infantry stands.

Communication is an important part of any unit, but is not that important in combat situations—a deliberate assault should be pre-planned and should not allow time for receiving any orders other than code words. Communication is most important in garrison-type situations, where units are waiting for new orders. This type of deployment is often very similar to an unplanned defense, and if such a unit were attacked, orders would have to be given to set up a strategy as you go along. Communication devices are either defensive or offensive/defensive in nature. Defensive communicators include wire and laser/maser communicators not linked to battle computers. These devices cannot move without disrupting communication. Offensive devices are either radios or laser/masers linked to battle computers (we shall ignore meson communicators since, once they come into being, all communication problems disappear). The problem is that laser/maser types linked to battle computers are mostly used on vehicles of tech level 9 or higher. Radios are nice, but a unit still needs one of these "sure" types of communication—even infantry. You can't do much about radio jamming at tech levels 5-6, but once laser/masers come in, use them.

Commo/detection countermeasures such as jammers or locaters linked to indirect fire units should be employed at high levels in the unit. A company-sized unit only needs one radio jammer, one radar jammer, and so on; no more.

Lastly, we have engineering equipment. This type of equipment should not be issued to everyone, such as mine sniffers and dozer blades on each tank, but instead used in specified engineer units. Most anti-minefield equipment is not needed since minefields are not usually well-camouflaged and are not big enough that it would take more time to drive around them than to get an engineer unit on line to remove them. Line charges on vehicles are also a good alternative to clearing mines manually. Bridges are a tactical disadvantage, but are necessary for main battle tanks of tech level 7 and below. Look at it this way, if you have to cross any rivers, your unit's mobility is tied into the bridge you are carrying. What do you do if the vehicle carrying your bridge gets shot up, go home? At tech level 8 and above, non-grav main battle tanks should be an ACV type, or be able to float.

In conclusion, when picking from the pre-designed equipment in Book 3, think about the tactical applications. Is there a better way to get around it? Imagine the worst possible enemy weapons, enemy deployment, and enemy countermeasure. The first thing a U.S. Army leader learns about strategy is to imagine the worst and prepare for it—and that way you'll never be surprised.

—Steven P. Drevik

ELECTRONICALLY EXPLORING THE TRAVELLER UNIVERSE

A Comprehensive Sector Generator

Writing a computer program to do some of **Traveller**'s basic procedures is a relatively simple process. Because the procedure itself is simple and easily understood, anyone conversant with Basic can probably make a program work with a minimum of effort. Writing such programs makes it possible to avoid much of the tedium associated with generating large amounts of **Traveller** material: making one world can be fun, but making a thousand is not only time-consuming, it is also tedious.

So, why aren't there a lot of **Traveller** programs out there now? Several reasons apply, but I'll deal with two.

First, writing polished programs that do a job precisely and easily is more work than it looks. People's preferences vary. Some want programs that exactly mimic the procedures in the **Traveller** rules. Others want their own special rules, variants, or exceptions included (or they want to at least be able to program them in). Still others want to be able to control the die rolls. Still yet others feel that they need a certain degree of user-friendliness.

All of this makes each individual programmer unwilling to expend a lot of time on the project. If he does (and some have), then others may not accept the program because of its peculiarities.

The second major consideration is *data format*. Once information is generated, it is shown to screen or printer, or written to disk. But without a standard format for saving the data to disk, the information cannot be massaged, analyzed, reproduced, or shared with others.

On the other hand, if a standard data format is available, any number of programmers can write programs that not only produce data, but they can also share that data and the programs that produce it.

STANDARD FORMAT

Under the guise of presenting a program that generates **Traveller** world UPPs, my column for this issue defines a standard format for world UPPs. With a standard format, anyone can be sure that the results of a program they write can be shared with others (given only a compatible computer or computer link).

The Standard UPP Format for worlds saves basic data generated in accordance with world generation rules in **Traveller**.

All data for a sector is contained in one file (if disk space or available memory precludes it all being in one file, two or more may be necessary). Each record in the file is one world UPP. Each record is divided into six fields:

Hex Location: Bytes 1-4. The hexagon location of the world within a sector map. Values range from 0101 to 3240.

UPP: Bytes 6-14. The actual generated UPP. Byte 6 is starport type; byte 7 is world size; byte 13 is always a hyphen (-); byte 14 is tech level.

Bases: Byte 16. A single code letter for any bases in the system.

Trade Classifications: Bytes 18-32. Up to five 2-letter trade classifications can be held in this field. Each classification is separated from the others by a space. It is possible to generate some of these trade classifications from the world UPP, but they are computed and included as part of the world data to allow quick scanning and analysis of the data.

Allegiance: Bytes 33-34. A 2-letter code for the interstellar government which claims the allegiance of the world.

Travel Zone: Byte 36. If the world is travel zoned, then this field holds the letter A (for Amber) or R (for Red).

Gas Giant: Byte 38. If the system has one or more gas giants, then this field has a G.

Tradeworld: Byte 40. Reserved for later use.

Explored?: Byte 42. Reserved for later use.

THE PROGRAM

The computer program listing handles basic world generation. It produces a complete sector and saves the data to disk. It can produce as many sectors as you want; all will be standard Imperial worlds.

The text file output is accessible through many text editing programs. The following program will read it from disk and place the data in the array A$(N) where N is the record number of a specific world. You can incorporate it into your own programs. For example, you could write a routine (put it in lines 2000-2999 and delete line 1130) to examine the entire array and find the highest population (or government, or tech level, or law level) world.

```
1000 INPUT"FILENAME? ";FI$
1010 PRINT CHR$(4);"OPEN ";FI$;",L50"
1020 PRINT CHR$(4);"READ ";FI$;",R0"
1030 INPUT R
1040 DIM A$(R)
1050 FOR A=1 TO R
1060 PRINT CHR$(4);"READ ";FI$;",R";A
1070 INPUT A$(A)
1080 NEXT A
1090 PRINT CHR$(4);"CLOSE"
1100 FOR A=1 TO R
1110 PRINT A$(A)
1120 NEXT A
1130 END
```

Sector Generator also saves a parameter file (with the same filename suffixed with an @) which is compatible with the file editor program contained on the *Trader*, *WordGen*, and *Beastiary* disks. The file editor lets you get into the data and manipulate it directly.

DECODING THE DATA

The Data Format page shows what all the data (actually more than this program produces) means. It is a compilation of basic data taken from a variety of **Traveller** sources.

—*Marc W. Miller*

DATA FORMATS

The information produced by the Imperial Interstellar Scout Service is provided in specific formats in order to allow quick and easy access to the data.

Data is grouped by *Sectors*, corresponding to sectors of the Imperium and of surrounding space.

Data Codes: The data in the UPP and in associated fields is coded to hold the maximum amount of information. This guide shows the basic interpretation of the codes used.

World UPPs

World UPPs (Universal Planetary Profiles) are constructed of eight discrete digits or characters in order to provide a quick readout of the basic information about the world. Each segment of the UPP is one digit or character. The data is presented in the following order:

World UPP Components

Code	Description
Starport	Type of starport facility on world.
Size	World diameter (in units of 1,600 kilometers).
Atmosphere	World atmosphere type.
Hydrographics	World surface covered with water (in tenths).
Population	Exponent of intelligent population.
Government	World government type.
Law Level	Degree of oppression by law.
Technological Level	Level of technological achievement.

Starports

Code	Starport Type
A	Excellent Quality. Refined fuel available. Annual maintenance overhaul available. Shipyard capable of constructing starships and non-starships present. Naval base and/or scout base may be present.
B	Good Quality. Refined fuel available. Annual maintenance overhaul available. Shipyard capable of constructing non-starships present. Naval base and/or scout base may be present.
C	Routine Quality. Only unrefined fuel available. Reasonable repair facilities present. Scout base may be present.
D	Only unrefined fuel available. No repair facilities present. Scout base may be present.
E	Frontier Installation. Essentially a marked spot of bedrock with no fuel, facilities, or bases present.
X	No Starport. No provision is made for any ship landings.

Starport indicates the best quality starport in the star system.

World Size Data

Size	Diameter	Mass	Area	Gravity	Esc Vel
1	1,600	.0019	.015	.122	1.35
2	3,200	.015	.063	.240	2.69
3	4,800	.053	.141	.377	4.13
4	6,400	.125	.250	.500	5.49
5	8,000	.244	.391	.625	6.87
6	9,600	.422	.563	.840	8.72
7	11,200	.670	.766	.875	9.62
8	12,800	1.000	1.000	1.000	11.00
9	14,400	1.424	1.266	1.120	12.35
A	16,000	1.953	1.563	1.250	13.73

Size is the size code from the Universal Planetary Profile (UPP) and expresses the diameter of a world in approximately 1,600 km units (or 1,000 mile units). Diameter is in kilometers. Mass is in Earths (Earth = 1) and assumes a density similar to Earth (5.5 grams per cubic centimeter). Area is in Earths (Earth = 1). Gravity is in Gs (Earth = 1). Escape velocity is in km per sec.

Atmosphere

Code	Description
0	No atmosphere. Requires vacc suit.
1	Trace. Requires vacc suit.
2	Very thin. Tainted. Requires combination respirator/filter.
3	Very thin. Requires respirator.
4	Thin. Tainted. Requires filter mask.
5	Thin. Breatheable.
6	Standard. Breatheable.
7	Standard. Tainted. Requires filter mask.
8	Dense. Breatheable.
9	Dense. Tainted. Requires filter mask.
A	Exotic. Requires special protective equipment.
B	Corrosive. Requires protective suit.
C	Insidious. Requires protective suit.
D	Dense, high. Breatheable above a minimum altitude.
E	Ellipsoid. Breatheable at certain latitudes.
F	Thin, low. Breatheable below certain altitudes.

Atmosphere type shows the general character of the atmosphere for a world on its surface.

Hydrographics

Code	Description
0	No water. Desert World.
1	10% water.
2	20% water.
3	30% water.
4	40% water.
5	50% water.
6	60% water.
7	70% water. Equivalent to Terra or Vland.
8	80% water.
9	90% water.
A	100% water. Water World.

Hydrographics shows the percentage of world surface covered by seas or oceans.

Note: If atmosphere type is A or above, fluid may be present in place of water.

Population

Code	Description
0 P	Few or no inhabitants.
1	Tens of inhabitants.
2	Hundreds of inhabitants.
3	Thousands of inhabitants.
4	Tens of thousands of inhabitants.
5	Hundreds of thousands of inhabitants.
6	Millions of inhabitants.
7	Tens of millions of inhabitants.
8	Hundreds of millions of inhabitants.
9	Billions of inhabitants.
A	Tens of billions of inhabitants.

Population shows a rough statement of population level for a world.

Government Type

Code	Description	Allegiance
0	No Government Structure.	
1	Company/Corporation.	
2	Participating Democracy.	
3	Self-Perpetuating Oligarchy.	
4	Representative Democracy.	
5	Feudal Technocracy.	
6	Captive Government/Colony.	
7	Balkanization.	
8	Civil Service Bureaucracy.	
9	Impersonal Bureaucracy.	
A	Charismatic Dictator.	
B	Non-Charismatic Dictator.	
C	Charismatic Oligarchy.	
D	Religious Dictatorship.	
E	Religious Autocracy.	
F	Totalitarian Oligarchy.	
G	Small Station or Facility.	Aslan.
H	Split Clan Control.	Aslan.
J	Single On-world Clan Control.	Aslan.
K	Single Multi-world Clan Control.	Aslan.
L	Major Clan Control.	Aslan.
M	Vassal Clan Control.	Aslan.
N	Major Vassal Clan Control.	Aslan.
P	Small Station or Facility.	K'kree.
Q	Krurruna or Krumunak Rule for Off-world Steppelord.	K'kree.
R	Steppelord On-world Rule.	K'kree.
S	Sept.	Hiver.
T	Unsupervised Anarchy.	Hiver.
U	Supervised Anarchy.	Hiver.
V		
W	Committee.	Hiver.
X	Droyne Hierarchy.	Droyne.
Y		
Z		

Government shows the basic governmental structure for a world.

Law Level

Code	Description
0	No prohibitions.
1	Body pistols, explosives, and poison gas prohibited.
2	Portable energy weapons prohibited.
3	Machineguns, automatic rifles prohibited.
4	Light assault weapons prohibited.
5	Personal concealable weapons prohibited.
6	All firearms except shotguns prohibited.
7	Shotguns prohibited.
8	Long bladed weapons controlled; open possession prohibited.
9	Possession of weapons outside the home prohibited.
A	Weapon possession prohibited.
B	Rigid control of civilian movement.
C	Unrestricted invasion of privacy.
D	Paramilitary law enforcement.
E	Full-fledged police state.
F	All facets of daily life rigidly legislated and controlled.
G	Severe punishment for petty infractions.
H	Legalized oppressive practices.
J	Routinely oppressive and restrictive.
K	Excessively oppressive and restrictive.
L	Totally oppressive and restrictive.
S	Special/Variable situation.

Law level indicates basic legal status and shows probability of harassment by local enforcers.

Technological Level

Code	Description	
0	Stone Age. Primitive.	
1	Bronze, Iron.	Bronze Age to Middle Ages.
2	Printing Press.	circa 1400 to 1700.
3	Basic Science.	circa 1700 to 1860.
4	External Combustion.	circa 1860 to 1900.
5	Mass Production.	circa 1900 to 1939.
6	Nuclear Power.	circa 1940 to 1969.
7	Miniaturized Electronics.	circa 1970 to 1979.
8	Quality Computers.	circa 1980 to 1989.
9	Anti-Gravity.	circa 1990 to 2000.
A	Interstellar community.	
B	Lower Average Imperial.	
C	Average Imperial.	
D	Above Average Imperial.	
E	Above Average Imperial.	
F	Technical Imperial Maximum.	
G	Robots.	
H	Artificial Intelligence.	
J	Personal Disintegrators.	
K	Plastic Metals.	
L	Comprehensible only as technological magic.	

Technological level shows the degree of technological sophistication to be expected on a world.

Base Codes

Base codes show the presence of military bases in a system; special codes deal with the presence of more than one type of base within the same system in order to maintain a single base code letter per system.

Bases

Code	Description	Allegiance
A	Naval Base and Scout Base.	Imperial.
B	Naval Base and Way Station.	Imperial.
C	Corsair Base.	Vargr.
D	Depot.	Imperial.
E	Embassy Center.	Hiver.
F	Military and Naval Base.	
G	Naval Base.	Vargr.
H	Naval Base and Corsair Base.	Vargr.
J	Naval Base.	
K	Naval Base.	K'kree.
L	Naval Base.	Hiver.
M	Military Base.	
N	Naval Base.	Imperial.
O	Naval Outpost.	K'kree.
P	Naval Base.	Droyne.
Q	Military Garrison.	Droyne.
R	Clan Base.	Aslan.
S	Scout Base.	Imperial.
T	Tlauku Base.	Aslan.
U	Tlauku and Clan Base.	Aslan.
V	Scout/Exploration Base.	
W	Way Station.	Imperial.
X	Relay Station.	Zhodani.
Y	Depot.	Zhodani.
Z	Naval/Military Base.	Zhodani.

Base codes indicate allegiance and general mission or type.

Trade Classifications

Trade classifications indicate obvious or important characteristics for worlds defined by the world UPP. They serve to show the potential for a world based on its capacity as a source of trade goods, a market for trade goods, or both.

Trade Classifications

Code	Description	
Ag	Agricultural.	
As	Asteroid Belt.	
Ba	Barren World.	
De	Desert World.	
Fa	Fascinating.	Hiver.
Fl	Fluid Hydrographics (in place of water).	
Hi	High Population.	
Ic	Ice-Capped.	
In	Industrialized.	
Lo	Low Population.	
nAg	Non-Agricultural.	
nIn	Non-Industrialized.	
Po	Poor.	
Ri	Rich.	
St	Steppeworld.	K'kree.
Va	Vacuum World.	
Wa	Water World.	

Remarks

Code	Description	
An	Ancient Site.	
C0	Chirper Population (0-9 indicates tenths of population).	
Cw	Chirper World.	Chirper.
Cp	Subsector Capital.	
Cx	Sector or Regional Capital.	
Ex	Exile Camp.	
D0	Droyne Population (0-9 indicates tenths of population).	
Dw	Droyne World.	Droyne.
Nh	Non-Hiver Population.	Hiver.
Nk	Non-K'kree Population.	K'kree.
Pr	Prison World.	
Rs	Research Station.	Imperial.

Remarks are additional statements not considered to be trade classifications.

Additional Data

The additional data fields show the travel status (when known), the presence of a gas giant, and the allegiance of the system.

Travel Codes

Code	Description	
R	Red. Interdicted. Dangerous. Prohibited.	Imperial
A	Amber. Potentially dangerous. Caution advised.	Imperial
G	Green. Unrestricted.	Imperial
F	Forbidden. Access prohibited.	Zhodani
U	Unabsorbed. Access restricted.	Zhodani

Imperial travel codes are provided by the *Journal of the Travellers' Aid Society*, and are used with permission of that publication.

Gas Giants: The code G indicates one or more gas giants present.

Allegiances

Code	Description	Sector (if less than one)
As	Aslan (general designation).	
A0	Aslan Tlauku Clan (numbers 0 to 9 indicate Tlauku clans).	
A-	Aslan Clan (2nd letter a through z indicates specific clan).	
Cs	Client State (usually of the Imperium).	
Ch	Chirper.	
Dr	Droyne.	
Fa	Federation of Arden.	Spinward Marches.
Gf	Glimmerdrift Spread.	Glimmerdrift.
Gl	Glorious Empire.	Trojan Reach.
Hv	Hive Federation.	
Jl	Julian Protectorate.	
Jr	Joint Action Confederation.	Empty Quarter
Im	Imperium.	
Kk	K'kree.	
La	League of Antares.	Antares.
Na	Non-Aligned (independent neutral world without affiliation).	
Ra	Ral Ranta.	Hinterworlds.
Sf	Senlis Foederate.	Trojan Reach.
So	Solomani Confederation.	
Sw	Sword Worlds.	Spinward Marches.
Sy	Sylean Federation.	Core.
Va	Vargr (general designation).	
V-	Vargr (2nd letter a to z indicates specific allegiance).	
Ve	Vegan Autonomous District.	Solomani Rim.
Zh	Zhodani Consulate.	
Z-	Zhodani (2nd letter a to z indicates specific allegiance).	

Allegiance indicates the government which dominates a system. Only selected allegiances are shown in this table.

Stellar Data

Stellar Data indicates the spectral class and size class of stars in the system. Up to three stars may be present and information shown on them.

Stellar Type

Code	Description	Temperature
B	White	14,200-28,000
A	Blue-White	8,000- 9,900
F	Yellow-White	6,100- 7,400
G	Yellow	4,700- 6,100
K	Orange	3,300- 5,000
M	Red	1,900- 3,600

Stellar type indicates the spectral classification of a star; colors are the essential perceived colors of the star's visible light. Temperature is given in degrees Kelvin.

Stellar Size

Code	Description	Diameter
Ia	Bright Supergiant.	52 -3500
Ib	Weak Supergiant.	30 -3000
II	Bright Giant.	14 -1000
III	Normal Star.	4.6- 360
IV	Subgiant.	3.3- 13
V	Main Sequence Star.	0.2- 10
VI	Subdwarf.	0.1- 1.2
VII	White Dwarf.	0.006- 0.018

Stellar size indicates the radius of the star expressed in solar radii and shows the relative differences to be expected.

TRAVELLER SECTOR GENERATOR

This program is written in Applesoft Basic for the Apple II series of computers. Minor changes may be necessary (primarily in disk access) for the program to work on other machines.

```
1000 TEXT:HOME:PRINT "Traveller Sector Generator"
1010 PRINT " This program generates world UPP data"
1020 PRINT " for Traveller. Copyright 1986 GDW, Inc."
1100 HX$ = "0123456789ABCDEFGHJKLMNPQRSTUVWXYZ"
1105 SP$ = "AAAABBCCDEEX"
1110 BA$ = "ABCDEFGHJKLMNPQRSTUVWXYZ":AL$ = "IM"
1140 DEF FNA(X) = INT (RND (4)*6) + 1
1150 DEF FNB(X) = FNA(X) + FNA(X)
1200 REM DETERMINE ALLEGIANCES
1210 PRINT:PRINT "Allegiances."
1220 PRINT " You may assign up to 10 allegiances (with a base
location and a radius for each). The same allegiance may be used
more than (to allow non-circular regions).": PRINT
1230 "How many allegiances in the area? >";A: IF A<1 OR
A>10 THEN 1230
1240 HOME:PRINT "Allegiances"
1250 PRINT " Allegiances are two-letter codes. The following use
special procedures in this program:"
1253 PRINT "A* CS C DR HV IM KK NA SO V* Z*"
1254 PRINT "(* = Wildcard)"
1260 PRINT:PRINT " The first allegiance is the default (automatic)
allegiance for the sector.":PRINT
1270 FOR B = 1 TO A
1280 PRINT "Allegiance ";B;
1290 INPUT " is: ";AL$(B):AL$(B) = LEFT$(AL$(B) + "BB",2)
1300 IF B=1 THEN LO$(B) = "1620":RA(B) = 22: GOTO 1330
1310 INPUT "Location (Hex) is:";
LO$(B):LO$(B) = LEFT$(LO$(B) + "0000",4)
1320 INPUT "Radius (parsecs) is: "; RA(B)
1325 IF RA(B) < 1 THEN RA(B) = 1
1330 NEXT B
1400 REM DESIGNATE DENSITIES
1410 HOME:PRINT "Densities"
1420 PRINT " You may assign up to 10 densitites (with a base
location and a radius for each).":PRINT
1430 INPUT "How many densities in the area?>";A1
1435 IF A1<1 OR A1>10 THEN 1430
1440 PRINT " Densities are decimal fractions.": PRINT
1450 PRINT " The first density is the default (automatic) density
for the sector.": PRINT
1460 FOR B = 1 TO A1
1470 PRINT "Density ";B;
1480 INPUT " is: ";DE(B): IF DE(B) > 1 THEN 1480
1490 IF B=1 THEN L1$(B) = "1620":RD(B) = 22: GOTO 1520
1500 INPUT "Location (hex) is:
";L1$(B):L1$(B) = LEFT$(L1$(B) + "0000",4)
1510 INPUT "Radius (parsecs) is: ";RD(B)
1515 IF RD(B) < 1 THEN RD(B) = 1
1520 NEXT B
1530 HOME
2000 REM PRODUCE SECTOR
2010 PRINT CHR$(4);"OPEN SECTOR, L50"
2020 FOR X = 1 TO 32
2030 FOR Y = 1 TO 40
2040 REM FIND ALLEGIANCE
2050 DR$ = "":AL$ = AL$(1):DR = 0
2060 FOR B = A TO 2 STEP-1
2070 D = SQR ((VAL (LEFT$(LO$(B),2))-X)*(VAL(LEFT$(LO$(B),2)-
X) + (VAL (MID$(LO$(B),3,2))-Y)*(VAL (MID$(LO$(B(,3,2))-Y): IF
D<RA(B) THEN AL$ = AL$(B): IF D>(.9*RA(B)) AND FNB(4)>9
THEN AL$ = "NA": IF FNB(4)>6 THEN AL$ = "CS": GOTO 2080
2080 NEXT B
2100 REM WORLD OCCURRENCE
2110 DE = DE(1): IF A1 < 2 THEN 2150
2120 FOR B = A1 TO 2 STEP-1
2130 D = SQR ((VAL (LEFT$(L1$(B),2))-X)*(VAL (LEFT$(L1$(B),2)-
X) + (VAL (MID$(L1$(B),3,2))-Y)*(VAL MID$(L1$(B),3,2))-Y): IF
D<RD(B) THEN DE = DE(B): GOTO 2140
2140 NEXT B
2150 RN = RND (4): IF RN > DE THEN 7070
2200 REM GENERATE WORLD UPP
2210 ST = FNB(4):ST$ = MID$(SP$,ST,1)
2220 SI = FNB(4)-2: IF AL$ = "DR" THEN SI = FNA(6)
2230 AM = FNB(2)-7 + SI:AM = AM*(AM>0): IF SI = 0 THEN AM = 0
2240 HY = FNB(2)-7 + SI: IF SI < 2 THEN HY = 0
2250 IF AM < 2 OR AM > 9 THEN HY = HY-4
2260 IF HY < 0 THEN HY = 0
2270 IF HY > 10 THEN HY = 10
2300 PO = FNB(3)-2
2310 GO = FNB(3)-7 + PO:GO = GO*(GO>0)
2320 LA = FNB(4)-7 + GO:LA = LA*(LA>0)
2330 IF PO < 1 THEN 2600
2400 REM FIND DROYNE PRESENCE
2410 DM = -5: IF SI > 0 THEN DM = 0: IF SI > 1 THEN DM = 1: IF
SI > 2 THEN DM = 2: IF SI > 3 THEN DM = 3: IF SI > 4 THEN DM = 2:
F SI > 5 THEN DM = 1: IF SI > 6 THEN DM = 0: IF SI > 7 THEN
DM = -2: IF SI > 8 THEN DM = -4: IF SI > 9 THEN DM = -6
2420 DN = -5: IF AM > 0 THEN DN = -4: IF AM > 1 THEN DN = -3: IF
AM > 2 THEN DN = -2: IF AM > 3 THEN DN = -1: IF AM > 4 THEN
DN = 0: IF AM > 5 THEN DN = 2: IF AM > 6 THEN DN = 1: IF AM > 7
THEN DN = 4: IF AM > 8 THEN DN = 3: IF AM > 9 THEN DN = -5
2430 IF AM > 10 THEN DN = -6: IF AM > 11 THEN DN = -7: IF
AM > 12 THEN DN = -3
2440 DO = 1: IF HY < 3 THEN DO = 0: IF HY = 0 THEN DO = -1
2450 IF HY > 7 THEN DO = 0: IF HY > 9 THEN DO = -3
2460 DP = -5: IF PO > 0 THEN DP = -4: IF PO > 1 THEN DP = -3: IF
PO > 2 THEN DP = -2: IF PO > 3 THEN DP = -1: IF PO > 5 THEN
DP = 1: IF PO > 7 THEN DP = 0: IF PO > 8 THEN DP = -2
2470 RR = FNB(5):RL = FNB(5)
2480 DM = DM + DN + DO + DP + RR
2490 IF DM < (-8) THEN 2600
2500 IF (DM > -9) AND (RL > 11) THEN DR = -5:DR$ = "DR"
2510 IF (DM > 0) AND (RL > 10) THEN DR = -4:DR$ = "DR"
2520 IF (DM > 9) AND (RL > 9) THEN DR = -2:DR$ = "DR"
2530 IF (DM > 15) AND (RL > 8) THEN DR = 0:DR$ = "DR"
2540 IF DR$ = "" THEN 2600
2550 IF FNB(4) > 5 THEN DR$ = "CH"
2560 PP = (FNB(3)-2) + DR: IF PP < 0 THEN PP = 0
2570 IF PP > 9 THEN PP = 9
2580 DR$ = LEFT$(DR$,1) + STR$(PP)
2600 REM FIND SPECIFIC ALLEGIANCE
2610 IF LEFT$(AL$,1) = "A" THEN 2700
2620 IF AL$ = "CH" THEN 2800
2630 IF AL$ = "DR" THEN 2800
2640 IF AL$ = "HV" THEN 2900
2650 IF AL$ = "KK" THEN 3000
2660 IF AL$ = "SO" THEN 3100
2670 IF LEFT$(AL$,1) = "V" THEN 3200
2680 IF LEFT$(AL$,1) = "Z" THEN 3300
2690 GOTO 3400
2700 REM ASLAN
2705 IF ASC (MID$(AL$,2,1)) < 48 OR ASC (MID$(AL$,2,1)) > 57
THEN 2720
2710 GO = 20: IF PO < 4 AND FNB(6) < 11 THEN GO = 16
2715 GOTO 2730
2720 WD = FNA(4):RD = FNA(3) + (-3*(PO < 4)) + (2*(PO = 9)) +
```

```
(3*(PO=10)): IF RD<0 THEN WD=0
2725 GO=16+WD: IF RD>6 THEN GO=17
2730 AR=VAL (MID$(AL$,2,1)): IF GO=20 AND AR=0 AND
MID$(AL$,2,1)<>"0" THEN AL$="A"+STR$(INT (RND (5)*10))
2735 LA=FNB(5)
2740 REM 2745 DM=3: IF ST>4 THEN DM=2: IF ST>6 THEN
DM=0: IF ST>8 THEN DM=-1: IF ST>9 THEN DM=-2
2750 IF PO<3 AND GO=16 THEN DM=DM-3: GOTO 2760
2755 IF PO<8 THEN DM=DM-1: IF PO<7 THEN DM=DM-1
2760 TL=FNA(4)+8+DM: IF TL>14 THEN TL=14
2765 GOTO 3600
2800 REM DROYNE
2810 IF AL$="DR" OR AL$="CH" THEN PO=FNA(4)+2
2820 IF AL$="DR" THEN A=FNA(4):GO=31: IF A<5 THEN
GO=7: IF A<3 THEN GO=6
2830 LA=(FNB(4)-6)+PO:TL=(FNB(5)+FNA(3))-2
2835 ST=(FNB(4)-7)+TL
2840 LA=LA*(LA>0):TL=TL*(TL>0):ST=ST*(ST>0)
2850 IF ST>12 THEN ST=12
2860 ST$=MID$("XXXXEEDCCBBAAAA",ST+1,1)
2870 GOTO 3700
2900 REM HIVERS
2905 IF PO<1 THEN GO=0:LA=0:TL=0: GOTO 3700
2910 NH=0: IF ((AM>0 AND AM<5) OR (AM>9 AND AM<13))
AND FNB(5)>8 AND PO>0 THEN NH=1
2915 GO=PO-FNA(6): IF GO<0 THEN GO=0
2920 IF GO=4 OR GO=5 THEN GO=26
2925 IF GO=6 OR GO=7 THEN GO=27
2930 IF GO=8 THEN GO=28
2935 IF GO=9 THEN GO=29
2940 IF GO=3 THEN GO=6
2945 IF PO<7 AND NH=1 THEN GO=6
2950 LA=FNA(4): IF NH=1 THEN LA=FNB(5)
2955 DM=3: IF ST$>"A" THEN DM=2: IF ST$>"B" THEN
DM=0: IF ST$>"C" THEN DM=-1: IF ST$>"D" THEN DM=-2
2960 IF (PO<4 AND GO<>6) THEN DM=DM-3
2965 IF (PO>3 AND PO<7) THEN DM=DM-2
2970 IF PO=7 THEN DM=DM-1
2975 TL=FNB(4)+8+DM
2980 IF TL>15 THEN TL=15
2985 GOTO 3700
3000 REM KKREE
3005 GO=23: IF PO>2 THEN GO=24: IF PO>5 THEN GO=25
3010 DM=(2*(ST$="A"))+(ST$="B")+(-1*(ST$="E"))+(-6*(
ST$="X"))
3015 DM=DM+(-2*(AM<3))+(-1*(AM=3))+(3*(AM=5 OR
AM=6 OR AM=8))+(-1*(AM=10))+(-2*(AM=11 O AM=13 OR
AM=14 OR AM=15))+(-3*(AM=12))
3020 DM=DM+(-2*(HY=0))+(1*(HY=2 OR HY=6))+(2*(HY=3
OR HY=4 OR HY=5))+(-1*(HY=8))+(-2*(HY 9))+(-3*(HY=10))
3025 NK=0:PO=FNA(4)+DM: IF PO>11 THEN
PO=12:NK=1:PO=FNB(4)-2:GO=(FNB(4)-7)+PO:GO=GO*(GO>-
0):LA=(FNB(4)-7)+GO:LA=LA*(LA>0): GOTO 3040
3030 GO=23: IF PO>2 THEN GO=24: IF PO>5 THEN GO=25
3035 LA=19
3040 IF PO<1 THEN PO=0:ST=10:ST$="E":GO=0:LA=0
3045 REM
3050 DM=3: IF ST>4 THEN DM=2: IF ST>6 THEN DM=0: IF
ST>8 THEN DM=-1: IF ST>9 THEN DM=-2: IF ST>11 THEN
DM=-9
3055 IF GO=23 THEN DM=DM-3
3060 IF GO=24 THEN DM=DM-1
3065 IF GO=25 THEN DM=DM+1
3070 TL=FNA(4)+9+DM
3075 IF TL>15 THEN TL=15
3080 GOTO 3600
3100 REM SOLOMANI
3110 GOTO 3400
3200 REM VARGR
3210 IF (FNB(5)+PO)>15 THEN GO=7
3220 GOTO 3400
3300 REM ZHODANI
3310 IF ST>11 THEN PO=FNA(4)+4
3320 GOTO 3400
3400 REM FIND TECH LEVEL
3410 TL=FNA(6)
3420 IF ST$="A" THEN TL=TL+6
3430 IF ST$="B" THEN TL=TL+4
3440 IF ST$="C" THEN TL=TL+2
3450 IF ST$="X" THEN TL=TL-4
3460 IF SI<5 THEN TL=TL-1: IF SI<2 THEN TL=TL-1
3470 IF AM<4 THEN TL=TL+1
3480 IF AM>9 THEN TL=TL+1
3490 IF HY>8 THEN TL=TL+1: IF HY>9 THEN TL=TL+1
3500 IF PO>0 AND PO<6 THEN TL=TL+1
3510 IF PO>8 THEN TL=TL+2: IF PO>9 THEN TL=TL+2
3520 IF GO=0 OR GO=5 THEN TL=TL+1
3530 IF GO=13 THEN TL=TL-2
3540 IF TL<0 THEN TL=0
3550 IF LEFT$(AL$,1)="Z" AND ((AM<3 AND TL<8) OR
(AM=3 AND TL<7) OR ((AM=4 OR AM=7 OR AM=9) AND
TL<6) OR ((AM 10 OR AM=11) AND TL<9) OR (AM=12 AND
TL<10)) THEN PO=0:GO=0:LA=0:TL=0
3560 GOTO 3700
3600 REM BASIC ALIEN TL LEVELLER
3610 IF AM<3 AND TL<7 THEN TL=7
3620 IF AM=3 AND TL<6 THEN TL=6
3630 IF (AM=4 OR AM=7 OR AM=9) AND TL<5 THEN TL=5
3640 IF (AM=10 OR AM=11) AND TL<8 THEN TL=8
3650 IF AM=12 AND TL<9 THEN TL=9
3700 REM GENERATE GAS GIANT
3710 GG=0: IF FNB(4)<10 THEN GG=1
3800 REM GENERATE TRAVEL ZONES
3810 TZ=0
3815 IF AL$<>"IM" THEN 3845
3820 IF DR$<>" AND TZ=0 THEN IF FNB(5)>8 THEN TZ=1
3830 IF ST$="X" THEN TZ=2
3840 IF TZ=0 AND FNB(4)>10 THEN TZ=1
3845 IF LEFT$(AL$,1)<>"Z" THEN 4000
3850 IF LEFT$(AL$,1)="Z" AND (ST$="C" OR ST$="D" OR
ST$="E") AND FNB(5)>10 THEN TZ=4
3860 IF ST$="X" AND LEFT$(AL$,1)="Z" THEN TZ=3
4000 REM GENERATE BASES
4010 B1=0:B2=0:B$=" "
4020 IF LEFT$(AL$,1)="A" THEN 4300
4030 IF AL$="DR" THEN 4900
4040 IF AL$="HV" THEN 5000
4050 IF AL$="KK" THEN 4500
4060 IF AL$="SO" THEN 4800
4070 IF LEFT$(AL$,1)="V" THEN 4600
4080 IF LEFT$(AL$,1)="Z" THEN 4700
4100 REM IMPERIAL BASES
4110 IF ST$<"C" AND FNB(5)>7 THEN B1=1
4120 IF ST$>"D" THEN 4150
4130 DM=-3: IF ST>4 THEN DM=-2: IF ST>6 THEN DM=-1: IF
ST>8 THEN DM=0: IF ST>9 THEN 4150
4140 IF (FNB(5)+DM)>6 THEN B2=1
4150 IF B1=1 AND B2=0 THEN B$="N"
4160 IF (FNB(4)+DM)>6 THEN B2=1
4170 IF B1=0 AND B2=1 THEN B$="S"
4180 IF B1=1 AND B2=1 THEN B$="A"
4190 IF (AL$<>"IM" AND AL$<>"CS") AND B1<>0 THEN
B$="J"
4200 IF (AL$<>"IM" AND AL$<>"CS") AND B2<>0 THEN
B$="M"
4210 GOTO 6000
```

```
4300 REM ASLAN BASES
4310 B1 = 0:B2 = 0:T1 = FNB(5):T2 = FNB(4):S1 = ASC
(ST$)-64:B$ = " "
4320 IF GO = 16 AND S1 < 3 AND T1 + (5-ST) > 13 THEN B1 = 1
4330 IF GO = 16 AND S1 < 3 AND T2 + (5-S1) > 12 THEN B2 = 1
4340 IF GO = 17 AND S1 < 5 AND T1 + (5-S1) > 8 THEN B1 = 1
4350 IF GO = 20 AND S1 < 5 AND T1 + (5-S1) > 6 THEN B1 = 1
4360 IF GO = 20 AND S1 > 5 AND T1 > 7 THEN B1 = 1
4370 IF GO = 22 AND S1 < 5 AND T1 + (5-S1) > 9 THEN B1 = 1
4380 IF (GO = 17 OR GO = 18 OR GO = 21) AND S1 < 5 AND
T2 + (5-S1) > 7 THEN B2 = 1
4390 IF GO = 19 AND S1 < 5 AND T2 + (5-S1) > 6 THEN B2 = 1
4400 IF GO = 22 AND S1 < 5 AND T2 + (5-S1) > 8 THEN B2 = 1
4410 IF GO = 18 AND S1 > 5 AND T2 > 7 THEN B2 = 1
4420 IF GO = 19 AND S1 > 5 AND T2 > 8 THEN B2 = 1
4430 IF B1 = 1 THEN B$ = "T"
4440 IF B2 = 1 THEN B$ = "R"
4450 IF B1 = 1 AND B2 = 1 THEN B$ = "U"
460 IF GO = 16 AND B1 = 1 THEN B$ = "T"
4470 GOTO 6000
4500 REM KKREE BASES
4510 IF FNB(5) > 6 THEN B1 = 1:B2 = 0:B$ = "K": GOTO 4550
4520 IF ST$ > "D" THEN 4550
4530 DM = 0: IF ST < 9 THEN DM = -1: IF ST < 7 THEN DM = -2: IF
ST < 5 THEN ST = -3
4540 IF FNB(4) + DM > 6 THEN B2 = 1:B$ = "O"
4550 GOTO 6000
4600 REM VARGR BASES
4610 IF FNB(5) > 6 THEN B1 = 1:B$ = "G": GOTO 4650
4620 DM = -2: IF ST > 4 THEN DM = -1: IF ST > 6 THEN DM = 0
4622 IF ST > 8 THEN DM = + 1: IF ST > 9 THEN DM = 2
4624 IF ST > 11 THEN D = 3
4630 IF FNB(5) + DM > 8 THEN B2 = 1:B$ = "C"
4640 IF B1 = 1 AND B2 = 1 THEN B$ = "H"
4650 GOTO 6000
4700 REM ZHODANI BASES
4710 DM = 2: IF ST > 4 THEN DM = 1: IF ST > 6 THEN DM = 0: IF
ST > 9 THEN 4740
4720 IF FNB(6) + DM > 8 THEN B1 = 1:B$ = "Z"
4730 IF ST < 5 AND FNB(4) > 10 THEN B1 = 2:B$ = "Y"
4740 REM
4750 GOTO 6000
4800 REM SOLOMANI BASES
4810 B2 = 0
4820 IF ST$ < "C" AND FNB(5) > 7 THEN B1 = 1
4830 IF B1 = 1 THEN B$ = "J"
4840 GOTO 6000
4900 REM DROYNE BASES
4910 IF ST$ > "D" THEN 4950
4920 IF FNB(5) + (4-(ASC (ST$)-64)) > 7 THEN B1 = 1:B$ = "P"
4930 IF GO = 6 THEN B1 = 2:B$ = "N"
4940 IF (FNB(5)-7) + TL > 6 THEN B2 = 1:B$ = "Q"
4950 GOTO 6000
5000 REM HIVER BASES
5010 B0 = FNB(5):B1 = 0:B2 = 0
5020 IF ST$ = "A" AND B0 < 6 THEN B1 = 6
5030 IF ST$ = "A" AND B0 > 7 THEN B1 = 7: IF B0 = 12 THEN
B1 = 8
5040 IF (ST$ = "B" AND ST$ = "C") AND B0 < 3 THEN B2 = 8
5050 IF ST$ = "B" AND (B0 = 10 OR B0 = 11) THEN B1 = 7
5060 IF ST$ = "B" AND B0 = 12 THEN B2 = 9
5070 IF ST$ = "C" AND (B0 = 10 OR B0 = 11) THEN B2 = 8
5080 IF ST$ = "C" AND B0 = 12 THEN B2 = 9
5090 IF ST$ = "D" AND (B0 = 2 OR B0 = 11) THEN B2 = 8
5100 IF ST$ = "D" AND B0 = 12 THEN B2 = 9
5110 IF ST$ = "E" AND B0 = 12 THEN B2 = 8
5120 IF ST$ = "X" AND B0 = 12 THEN B2 = 8
5130 IF B1 = 6 THEN B$ = "E"
5140 IF B1 = 7 THEN B$ = "L"
5150 IF B2 = 8 THEN B$ = "M"
5160 IF B2 = 9 THEN B$ = "F"
5170 GOTO 6000
6000 REM TRADE CLASSIFICATIONS
6010 TC$ = "":IF AL$ = "KK" AND NK = 1 THEN TC$ = TC$ + "NK "
6030 IF AL$ = "HV" AND NH = 1 THEN TC$ = TC$ + "NH "
6040 IF AL$ = "HV" AND NH = 1 AND PO > 7 AND (AM = 3 OR
AM = 4 OR AM = 10 OR AM = 11 OR AM = 12) THEN
TC$ = TC$ + "FA "
6045 IF PO > 8 THEN TC$ = TC$ + "HI "
6047 IF PO < 4 THEN TC$ = TC$ + "LO "
6050 IF (AM < 3 OR AM = 4 OR AM = 7 OR AM = 9) AND PO > 8
THEN TC$ = TC$ + "IN "
6055 IF (AM < 2 AND HY > 0) THEN TC$ = TC$ + "IC "
6060 IF PO < 7 THEN TC$ = TC$ + "NI "
6065 IF AM > 9 AND HY > 0 THEN TC$ = TC$ + "FL "
6070 IF (LEFT$(AL$,1) = "A" OR AL$ = "HV" OR AL$ = "KK")
AND (AM = 6 OR AM = 8) AND (PO > 5 AND PO < 9) THEN
TC$ = TC$ + "RI ":GOTO 6120
6080 IF LEFT$(AL$,1) = "V" AND (AM = 6 OR AM = 8) AND
(PO > 5 AND PO < 9) AND (GO < > 7) THEN TC$ = TC$ + "RI ":
GOTO 6120
6090 IF AL$ = "DR" AND (AM = 6 OR AM = 8) AND (PO > 5 AND
PO < 9) THEN TC$ = TC$ + "RI ": GOTO 6120
6100 IF LEFT$(AL$,1) = "Z" AND (TZ = 3 OR TZ = 4) AND (AM = 6
OR AM = 8) AND (PO > 5 AND PO < 9) THEN TC$ = TC$ + "RI ":
GOTO 6120
6110 IF (AM = 6 OR AM = 8) AND (PO > 5 AND PO < 9) AND
(GO > 3 AND GO < 10) THEN TC$ = TC$ + "RI "
6120 IF (AM > 1 AND AM < 6) AND HY < 4 THEN TC$ = TC$ + "PO"
6130 IF HY = 10 THEN TC$ = TC$ + "WA "
6140 IF HY = 0 AND AM > 1 THEN TC$ = TC$ + "DE "
6150 IF SI = 0 THEN TC$ = TC$ + "AS "
6160 IF AM = 0 AND SI < > 0 THEN TC$ = TC$ + "VA "
6170 IF AL$ = "KK" AND (SI = 7 OR SI = 8) AND (AM = 6 OR
AM = 8) AND (HY > 2 AND HY < 6) THEN TC$ = TC$ + "ST "
6180 IF (AM > 3 AND AM < 10) AND (HY > 3 AND HY < 9) AND
(PO > 4 AND PO < 8) THEN TC$ = TC$ + "AG "
6190 IF AM < 4 AND HY < 4 AND PO > 5 THEN TC$ = TC$ + "NA "
6200 IF PO = 0 AND GO = 0 AND LA = 0 THEN TC$ = TC$ + "BA "
6210 TC$ = LEFT$(TC$ + " ",15)
6500 REM CREATE WORLD DATA STRING
6510 A$ = "":IF X < 10 THEN A$ = "0"
6530 A$ = A$ + STR$(X):IF Y < 10 THEN A$ = A$ + "0"
6550 A$ = A$ + STR$(Y) + " "
6560 IF HY < 0 THEN HY = 0
6570 IF AM < 0 THEN AM = 0
6580 A$ = A$ + ST$ + MID$(HX$,SI + 1,1) + MID$(HX$,AM + 1,1) +
MID$(HX$,HY + 1,1)
6590 A$ = A$ + MID$(HX$,PO + 1,1) + MID$(HX$,GO + 1,1) +
MID$(HX$,LA + 1,1) + "-"
6600 IF TL < 0 THEN TL = 0
6610 A$ = A$ + MID$(HX$,TL + 1,1) + " ":A$ = A$ + B$ + " "
6625 IF PO = 0 THEN DR$ = ""
6630 IF DR$ < > " " THEN A$ = A$ + DR$ + " " + LEFT$(TC$,12):
GOTO 6650
6640 A$ = A$ + TC$:A$ = A$ + AL$ + " "
6660 IF TZ = 1 THEN A$ = A$ + "A "
6670 IF TZ = 2 THEN A$ = A$ + "R "
6680 IF TZ = 3 THEN A$ = A$ + "F "
6690 IF TZ = 4 THEN A$ = A$ + "U "
6700 IF TZ = 0 THEN A$ = A$ + " "
6710 IF GG = 0 THEN A$ = A$ + " "
6720 IF GG = 1 THEN A$ = A$ + "G "
7000 REM SAVE TO DISK
7010 R = R + 1
7020 PRINT CHR$(4);"WRITE SECTOR, R";R
```

```
7030 PRINT A$
7040 PRINT CHR$(4)
7050 PRINT A$
7070 NEXT Y:NEXT X
7090 REM SAVE FILE LENGTH
7100 PRINT CHR$(4);"WRITE SECTOR, R0"
7110 PRINT R
7120 PRINT CHR$(4);"CLOSE"
7130 REM SAVE FILE PARAMETERS
7140 INPUT "NAME THIS FILE?>";FI$
7150 PRINT CHR$(4);"RENAME SECTOR,";FI$
7160 PRINT CHR$(4);"OPEN ";FI$;"@"
7170 PRINT CHR$(4);"WRITE ";FI$;"@"
7180 PRINT 9:PRINT R:PRINT 49
7190 PRINT "HEX ":PRINT 4
7200 PRINT "UPP ":PRINT 9
7210 PRINT "BASES ":PRINT 1
7220 PRINT "TRADE CLA":PRINT 14
7280 PRINT "ALLEG ":PRINT 2
7290 PRINT "TRAVEL ZO":PRINT 1
7300 PRINT "GAS GIANT":PRINT 1
7310 PRINT "TRADEWRLD":PRINT 1
7320 PRINT "EXPLORED?":PRINT 1
7390 PRINT CHR$(4);"CLOSE"
7400 END
```

ZHODANI RELAY STATION PLACEMENT

```
100 TEXT:HOME:PRINT "Zhodani Relay Station Placement."
110 PRINT " This program examines an existing sector file and
determines the need for, and locations of, Zhodani relay stations
(which must be placed between Zhodani naval bases more than
four hexes distant)."
120 PRINT " This program originally appeared in Challenge
Magazine No. 26.":PRINT
500 DIM PO(32,40),PP(32,40),OD(13,13)
510 DIM F2(169),F3(169),F4(169),F5(169)
520 DIM F1(169)
531 NA$(1)="WORLD "
532 NA$(2)="ZHO WORLD "
533 NA$(3)="NAVAL BASE"
534 NA$(4)="DEPOT "
535 NA$(5)="RELAY "
2000 INPUT "Filename? >";FI$
2010 PRINT CHR$(4);"OPEN ";FI$;",L50"
2020 PRINT CHR$(4);"READ ";FI$;",R0"
2030 INPUT R
2031 DIM HX$(R)
2040 FOR A=1 TO R
2050 PRINT CHR$(4);"READ ";FI$;",R";A
2060 INPUT A$
3000 X=VAL(LEFT$(A$,2)):Y=VAL(MID$(A$,3,2))
3001 HX$(A)=LEFT$(A$,4)
3005 Z=1
3010 IF MID$(A$,33,1)="Z" THEN Z=2
3020 IF MID$(A$,16,1)="Z" THEN Z=3
3040 IF MID$(A$,16,1)="Y" THEN Z=4
3050 IF MID$(A$,16,1)="X" THEN Z=5
3060 PO(X,Y)=Z:PP(X,Y)=A
3070 NEXT A
4000 HOME:FOR X=1 TO 32
4005 FOR Y=1 TO 40:VTAB 1
4010 IF PO(X,Y)<1 THEN 6000
4012 PRINT "World Hex "; RIGHT$("0"+STR$(X),2);
```

```
RIGHT$("0"+STR$(Y),2);" ";NA$(PO(X,Y))
4020 REM
4025 F1=0:F2=0:F3=0:F4=0:F5=0
4027 PRINT "Worlds within jump-4: ";
4028 PRINT:PRINT
4029 FOR N=Y-5 TO Y+5:FOR M=X-5 TO X+5
4040 IF M<1 OR M>32 THEN 4900
4055 IF N<1 OR N>40 THEN 4894
4056 IF X=M AND N=Y THEN FLASH:PRINT PO(X,Y);:
NORMAL:GOTO 4894
4057 IF X=M AND N<>Y THEN Z1=ABS (Y-N): GOTO 4080
4060 IF Y=N AND X<>M THEN Z1=ABS (X-M): GOTO 4080
4063 EV=0:OD=0: IF (X/2=INT (X/2)) AND (M/2=INT (M/2))
THEN EV=1
4064 IF (X/2<>INT (X/2)) AND (M/2<>INT (M/2)) THEN EV=1
4065 IF EV<>1 THEN OD=1
4070 X1=X-M:Y1=Y-N:Z1=SQR ((X1*X1)+((.857)*Y1*Y1))
4071 IF OD=1 THEN Z1=Z1+.5
4080 IF Z1>4 THEN 4890
4089 IF PO(M,N)=1 THEN F1=F1+1:F1(F1)=PP(M,N)
4090 IF PO(M,N)=2 THEN F2=F2+1:F2(F2)=PP(M,N)
4100 IF PO(M,N)=3 THEN F3=F3+1:F3(F3)=PP(M,N)
4110 IF PO(M,N)=4 THEN F4=F4+1:F4(F4)=PP(M,N)
4120 IF PO(M,N)=5 THEN F5=F5+1:F5(F5)=PP(M,N)
4180 REM
4890 IF PO(M,N)=0 THEN PRINT ".";: GOTO 4894
4891 PRINT PO(M,N);
4892 IF X=M AND N=Y THEN PRINT "*";
4894 REM
4900 NEXT M:PRINT
4902 NEXT N:PRINT
5000 REM
5010 REM
5011 IF F1>0 THEN PRINT NA$(1);": ";F1;" ";: FOR J=1 TO
F1: PRINT HX$(F1(J));" ";: NEXT:PRINT
5012 IF F2>0 THEN PRINT NA$(2);": ";F2;" ";: FOR J=1 TO
F2: PRINT HX$(F2(J));" ";: NEXT:PRINT
5013 IF F3>0 THEN PRINT NA$(3);": ";F3;" ";: FOR J=1 TO
F3: PRINT HX$(F3(J));" ";: NEXT:PRINT 5014 IF F4>0 THEN
PRINT NA$(4);": ";F4;" ";: FOR J=1 TO F4: PRINT HX$(F4(J));"
";: NEXT:PRINT
5015 IF F5>0 THEN PRINT NA$(5);": ";F5;" ";: FOR J=1 TO
F5: PRINT HX$(F5(J));" ";: NEXT:PRINT
5016 IF F2=0 THEN 6010
5017 IF (F3+F4+F5)<>0 THEN 6010
5018 PRINT "Relay station needed."
5019 R1=F2(INT(RND (90)*F2+1))
5020 PRINT CHR$(4);"OPEN ";FI$;",L50"
5030 PRINT CHR$(4);"READ ";FI$;",R";R1
5040 INPUT A$
5050 A$=LEFT$(A$,15)+"X"+MID$(A$+" ",17,31)
5060 PRINT CHR$(4);"WRITE ";FI$;",R";R1
5070 PRINT A$
5080 PRINT CHR$(4);"CLOSE"
5090 PO(VAL(LEFT$(A$,2)), VAL(MID$(A$,3,2)))=5: GOTO 4020
6000 REM
6010 NEXT Y:6020 NEXT X
7000 FOR Y=1 TO 40: FOR X=1 TO 32
7010 IF PO(X,Y)=0 THEN PRINT ".";: GOTO 7020
7015 PRINT PO(X,Y);
7020 NEXT X:NEXT Y
7030 END
```

Tournament

The resort complex of New Arcadia on Thalia offers a highly varied menu of ways in which visiting dignitaries can relax. Various facilities are provided for all manner of physical or athletic pursuits, social events, and the like. A wide range of stimulating mental diversions is offered as well, one of the most unusual being a large-scale wargame called *Tactics Twelve*.

Like all wargames back to the earliest known versions, this game casts the opponents (interested guests paired randomly by computer) in the roles of generals commanding certain specific forces. What makes this game unusual, however, is the fact that the game is conducted over a stretch of actual terrain covering some 100 square miles of wilderness, using actual military units to execute battle plans.

The management of New Arcadia has worked out special arrangements with several mercenary units, which provide the troops employed in the games. The maneuvers serve as training exercises for the troops, giving them valuable experience in actual combat situations without the danger of losing men in the process...for the new Arcadia operation is fully computerized, with the weapons issued firing low-power, nonlethal laser beams which automatically register on suitable targets (light-sensitive fabrics incorporated in uniforms and the like) and determine the success or failure of each man's fire. Casualties are notified to discontinue action (their weapons are automatically inactivated). In this way, the effects of combat are well simulated, providing one of the best possible training grounds for combat available.

In return, the resort gets the ability to stage these elaborate games, giving guests with military interests a chance to act as a general, safe and secure in a headquarters bunker, watching as his operations unfold. It is an expensive but immensely popular extension of an ancient hobby (wargaming) and has made New Arcadia one of the most popular (and profitable) resorts on Thalia.

Referee's Information:

This is a sort of "make-your-own" *Amber Zone*. The full-scale wargames at New Arcadia have a variety of interesting applications to a **Traveller** campaign.

First off, a group which is just getting into *Mercenary* or *Striker* activities on a level of anything up to regimental size might be hired to play/train at New Arcadia. The referee can set up any of a number of "mercenary tickets" which reflect different game situations. Campaigns using *Mercenary* and battles resolved according to *Striker* can then be staged. The participants, when put out of action, are not killed, merely removed from the action until the game is over.

The referee will find in this an excellent way to allow players to learn how to handle *Mercenary* or *Striker* operations before actually entering a battle where their decisions will destroy a unit carefully recruited and equipped after years of work and effort. Weak links in unit organization can be corrected, and, most importantly, the players can acquire some of the experience their characters are supposed to have earned...often an important consideration in complex role-playing such as goes into **Traveller** military operations.

Used in this fashion, the situation is something of a planetbound *Trillion Credit Squadron* adventure. It offers, though, little in the way of physical danger for the adventurers, and could be considered rather dull by some.

However, other problems can be interjected as desired to spice things up. Characters might be hired to covertly

Volcanoes

kph, events are from composite or cinder cones. They are made of hot ash and dust suspended in gases from the eruption. These gases buoy up the ash and dust so the low frictional resistance gives a very high speed. They have temperatures of about 800° C. The classic example occurred in 1902 on the island of Martinique. Mt. Pelee erupted, releasing a *nuee ardente*, killing 28,000 people and burying most of the city of St. Pierre.

It should be obvious how dangerous this event can be to the intrepid adventurers. A vacc suit can save you from suffocating on the ash and dust (which is what kills most of its victims) but with speeds of up to 100 kph, you still could get buried alive and possibly roasted (depending on the heat resistent qualities of your vacc suit).

A more disastrous possibility is for your spaceship to be buried under a few tons of ash and dust. Few ships are designed to take this kind of punishment.

Lahar: A related occurrence to the *nuee ardente* is a *lahar*. Lahars happen when a *nuee ardente* meets a body of water, usually a lake or river, and forms a mudflow or a landslide. The speed is reduced to about a third, and the temperature is cut down several hundred degrees, but they can still entomb unwary adventures in thousands of tons of boiling hot mud. In addition, *lahars* can carry large boulders tens of kilometers in a few minutes.

Maar: These are shallow, round, pit-like depressions, about a kilometer in diameter. They can often be filled with a light layer of their own ejecta (ash and pyroclastic material), and are not easy to spot unless you know what to look for. Fortunately, these formations are very rare.

Maars erupt irregularly, off-and-on, with very little warning (picture a giant Saturn 5 engine, turned upside down and ignited, and you'll have a good idea of what one of these things can be like). *Maars* can occur in groups, but they don't all erupt at the same time. A field

Any world, if it is to be of interest to the players, will have potential natural as well as man-made dangers. Natural dangers are not just plants and animals. They also include things like climate, planetquakes, and volcanoes.

This article will deal with volcanoes, describing a few salient facts about them, and giving some suggestions on how they can be realistically portrayed in a **Traveller** setting.

VALUE

Volcanoes bring deposits of valuable materials and chemicals to the surface. These include gold, radioactives, and other metals, in addition to more mundane things like pumice or sulfur and others. Volcanic areas can also supply large amounts of geothermal energy, and large power plants may be located in these regions.

TYPES

First, there are three types of volcanoes, cinder cone, shield/dome, and composite.

Cinder Cones: Cinder cones are formed when fragmentary material is explosively ejected from a volcanic vent. Large particles will profile up to 30° (from ground level) while small particles, no more than 10°. The slope can be important if the adventurers need to climb a volcano for some reason. The volcano in Paricultin, Mexico, which formed in a peasant farmer's field in 1945, is a good example of a cinder cone.

Shield/Dome: Shields are formed from free-flowing, low viscosity lavas. Examples are Mauna Loa on the Hawaiian island of Oahu and Olympus Mons on Mars. Domes are high viscosity lavas. It's easier to visualize if you think of the lava as cold toothpaste being squeezed out of a tube. Both the shield and dome volcanoes have slopes of 6-12°.

Composite: The composite type is also called the strato-volcano. It has alternating lava flow and pyroclastics beds. Pyroclastics are the solids ejected during an eruption which range in size from ash to boulders and are not part of the original ground or the volcano if it is re-erupting. Examples are Etna in Sicily, Fujiyama in Japan and Vesuvius in Italy. Slopes are of a wide range but tend towards the 30° of the cinder cone.

The type of cone you find will tell what the general area is like geologically. Continental volcanoes are composites (the most common) and domes. Oceanic volcanoes are mainly shields. Cinder cones occur both on continents and oceans (as in some of Iceland's recent additions).

DANGERS

Different volcanoes exhibit different characteristics, and have different dangers. Among those encountered around continental volcanoes are the *nuee ardente*, the *lahar*, and the *maar*.

Nuee Ardente: A particularly dangerous volcanic event is the *nuee ardente*. These rapidly moving, 100+

of them is not unlike a minefield with the mines going off one at a time at random. Since they were first noted and described in Germany, the word *maar* comes from the German word for lake. The *maars* in Germany went extinct and later filled with water to form lakes. It is very easy to mistake a *maar* for a meteor crater.

"...picture a giant saturn 5 engine, turned upside down and ignited..."

Oceanic volcanoes present as many dangers to a planet-bound party as continental ones. Remember that oceanic volcanoes only originate underwater—they can rise thousands of feet above the surface. Oceanic lavas are free-flowing (remember shield volcanoes) and form three types of land-forms: *pahoehoe*, *Aa*, and pillow lava.

Pahoehoe: *Pahoehoe* (pronounced pa'-hoy-hoy) is highly fluid and spreads in sheets. A thin, glassy, elastic skin forms at the surface and is then dragged into ropey, filamented folds as the fluid lava flow continues underneath the solid surface. *Pahoehoe* is Hawaiian for "ropey".

Aa: As *pahoehoe* flows it loses volatiles and becomes a more viscous lava which forms a type called *aa* (ah-ah) which is Hawaiian for what a bare-footed person says when walking on it (really!). The reason for this is that *aa* lava hardens into an incredibly rough, jagged, clinker-like surface. A good set of boots will not last more than a week. *Aa* also tends to be blocky, with pieces from football to house size which can shift unpredictably.

Hopefully, the ill-equipped or clumsy character will have a good medic nearby if he or she falls down. *Aa* can easily cut a vacc suit or ballistic cloth armor or jack (about a 50% chance of a serious mishap). A field of *aa*-type lava is also not the place to have a belly landing, either. The rough, jagged surface will do the ship's hull very little good.

Pillow Lava: Pillow lava is formed when molten lava hits water. This is not very hazardous unless you get too close.

THE BIG BLAST

Even more dangerous than anything yet mentioned is the much rarer and most spectacular *phreatic* (steam blast) erup-tions. These occur when the superheated steam and other gases, build up to colossal pressures, causing a massive ex-plosion. The blast (not unlike a nuclear explosion) throws tons of volcanic ash and pulverized rock into the air, often significantly changing the shape of the volcano itself. After the eruption the volcano can reform (as Krakatoa is doing now).

The danger to any adventurer is obvious. Such an eruption is dangerous to people at great distances, not to mention any ships on the surface nearby.

The most famous phreatic event was Krakatoa, in the late 19th century. That blast has been estimated at 100 megatons The sound was heard 2,000 miles away in Australia, a sea wave 40 meters (130 feet) high was created and registered as far away as the English channel. The dust was blown so high in the at-mosphere that weather patterns were changed slightly (deep-red sunsets were seen for years as well). Although less famous, the eruption of Tamboura in 1817 ejected enough dust into the atmosphere to cause the so-called "Year Without a Sum-mer," where snow fell in New England in June. Even larger blasts have taken place in prehistoric times. A more recent event, Mount St. Helens, was a mere burp by comparison.

ACTIVITY

To complicate matters, volcanoes can be active, extinct, or dormant. It's easy to spot an active volcano...most of the time you just have to look at it. If not actually erupting, it is usually smoking (Mauna Loa in Hawaii, for example).

Extinct volcanoes are not a concern—they are harmless mountains of rock. The problem comes in telling if a particular volcano is really extinct or just long dormant. There is no easy, short test than can be applied...you just have to study a par-ticular volcano for a while.

Mt. St. Helens is a good case in point. Inactive for decades, the volcano suddenly began pouring forth steam and shaking the ground. This went on for some time, but even the best scientists on the scene couldn't say exactly when St. Helens was going to erupt. The final event was sudden enough that several geologists were caught in a helicopter when it finally blew.

A CLOSING NOTE

For anyone who becomes too confident in their geology skill, consider the following. On May 7, 1902, Professor Landes of St. Pierre's College said, in a statement issued to calm the populace: "The Mountain Pelee presents no more danger to the inhabitants of Saint Pierre than does Vesuvius to those of Naples." On May 8, 1902, at 8:02 A.M., Mt. Pelee released the aforementioned *nuee ardente* which wiped out Professor Landes and 28,000 others.   —*Brent Reck*

Excerpts from *Grand Survey*

Editor's Note: To accompany Mr. Reck's article, the Digest Group has consented to allow us to run a few excerpts from their newly published **Traveller** rules supplement, *Grand Survey*, available from them for $7.00 (See their ad on the inside cover for ordering information).

PLANETOGRAPHER'S CHECKLIST

Traveller players occasionally find themselves in a Scout crew, helping the Scouts to survey a system, or searching for resources on an uncharted world. This planetographer's checklist should help in playing out these roles. For convenience, the checklist is divided into sections by location of survey instruments. Remember that some survey instruments are active rather than passive; their use should be minimized in possible contact situations.

In Upper Atmosphere: Continue survey as desired, using close range for higher accuracy. Use densitometers, thermometers, EMS radar, ladar, m-radar, infrared, and optical sensors to finish accurate mapping. Use EMS mapping instruments mentioned above to ascertain terrain types. Use densitometers and EMS infrared sensors to search for minor faults and volcanism. The UPP atmosphere and hydrosphere digits can be precisely determined.

On World Surface: Continue survey as desired, using surface and lower atmosphere sensor scans for greater accuracy.

Density: Basic **Traveller** assumes all worlds have a density of "1". A world's actual density influences its gravity, mass, and other related features. Density is also important to the process of mapping and to the possible existence of certain resources.

To determine a world's true density, consult the General World Type Table (Table 6.1) and the Mean World Density Table (Table 6.2). First, determine the general world type: gas giant, molten core, rocky body, or icy body. Gas giant will be known automatically; Table 6.1 handles determination of the other types.

Secondly, determine the exact density from the Mean World Density Table by consulting the proper column for the world type and rolling 3D. Densities are expressed in values based on Terra's density, a standard of 1 (5.517 grams per cubic centimeter). The density is referred to as K in later formulas.

Example: A world has a UPP of 5 and an atmosphere of 2. Consulting the General World Type Table indicates no DM for size 5 and a +1 DM for atmosphere 2. We roll 2D and get 10, which with the DM of +1 gives 11. Consulting table yields a general type of "Rocky Body". Moving to the Mean World Density Table and rolling 3D on the Rocky Body column results in an 11, for a mean density (K) of 0.66 standard.

MAPPING DATA

This section provides the fundamental data needed to ultimately draw a detailed map of the world. Using this data to draw the map is covered in the chapter "Mapping the World".

Number of Tectonic Plates: Tectonic "plates" are rigid rock segments forming the outer layer of a world's structure, floating independently of one another on a layer of molten fluids. The gradual movement (perhaps 1-6 inches per year, on Terra) of these plates results in many important elements of planetary development. Where plates come together, there may be areas of volcanism, heavy seismic activity, and mountain-building. On Terra, there are eight major plates, and a number of minor ones.

Only a molten core world has a chance of multiple major plates; rocky and icy bodies automatically have only one tectonic plate. The number of major plates on a molten core world is established by taking UPP size + UPP hydrosphere and subtracting a roll of 2D. A result of 1 or less indicates that there is little geological activity on the planet, with the entire surface being one major plate (and, perhaps, a few minor plates).

Example: A molten core world has a UPP size of 8 and a UPP hydrosphere of 3, which yields a sum of 11. Subtracting a 2D roll of 5 means this world has 6 tectonic plates.

Molten Core: World has a metallic molten core surrounded by a cooler crust.

Rocky Body: World has a cool, rocky core and crust.

Icy Body: World is composed of ices, with few or no rocky components.

Gas Giant: A large planet (20,000 to 120,000 km diameter) composed primarily of hydrogen and hydrogen compounds. May or may not have a core of solid matter.

Table 6.1
GENERAL WORLD TYPE

(non-Gas Giant)	
Die Roll	*World Type*
2-10	Molten Core
11-14	Rocky Body
15+	Icy Body

Modifiers:
If size 4−, DM+1 If size 6+, DM+2. If atm 0-3, DM+1 If atm 6+, DM−2. When using Scouts: If outer zone, DM+6

Table 43
SIZE OF TECTONIC PLATES

Die	*Size in Hexes*
1	2D × 5
2	2D × 10
3	2D × 15
4	2D × 20
5	2D × 25
6	2D × 30

SEISMIC DATA

Seismic data describe a world's likelihood of geologic activity, based on a seismic stress factor. These data are purely optional, but can lend considerable interest to a world, and can become the basis of intriguing adventure situation.

Stress Factor: The stress which cause seismic activity stem from several sources, including the nature of the world, its distance from its star, the size and distance of planetary satellites, and a variety of less important factors. These are accounted for by a stress factor, which indicates the relative occurrence of seismic activity.

To compute a stress factor for a world (drop fractions):
*Basic **Traveller**:*
(2D − 3) + Planet Modifier + Satellite Modifier(s)
Scouts:
(1D − 3) + Planet Modifier + Satellite Modifier(s) + Orbit Modifier

Planet Modifier: Molten Core = 1D − 3; Rocky Body, Icy Body = 0

Satellite Modifier (compute for each satellite): Satellite diameter in km + (orbit distance in world radii × 64)

Orbit Modifier: Stellar Mass (from Book 6 *Scouts*) + Orbital distance (in AU's)

Example: A molten core world has 2 satellites (one, diameter 1200 km, at a distance of 7 radii and another, diameter 600 km, 25 radii distant) and orbits its star (stellar mass of 1.7) at 1.6 AU's. Rolling the first 1D − 3 in the Scouts formula results in − 1. Rolling 1D − 3 for the planet modifier (molten core) gives 3. The satellite modifier for the first satellite is 1200/(7 × 64), or 2. The satellite modifier for the second satellite is 600/(25 × 64), or 0. The orbit modifier for the world is 1.7/1.6, or 1. The computed stress factor is thus − 1 + 3 + (2 + 0) + 1, or 5.

Volcanoes: Once the stress factor is known, the number of volcanoes that exist on the world can be determined, if desired. Roll 2D − 7 and add the stress factor ÷ 2 (drop fractions). Make this roll once for each continent, or 1D times where only one continent exists. The results give the number of important volcanoes on each land mass.

Undersea volcanoes can be ignored, except where undersea colonization is important (such as on a tech level 10 + water world). If they are determined, the same procedure applies, once per ocean or 1D times for a water world.

Example: A world has 6 continents and a stress factor of 5. Rolling six times 2D − 7 + stress factor ÷ 2, gives 2 + 3 + 0 + 2 + 0 + 3, or 10 notable volcanoes on the world.

GEOLOGIC ACTIVITY

Quakes and volcanoes can't be ignored when they occur. But when is that, and what are the effects?

Seismic Quakes: Seismic quakes of enough intensity to be noteworthy are not common, but do happen from time to time.

The basic chance of having a quake occur in any particular hex during a 24-hour period is determined as follows. A roll of 4D is made once each standard day, with the planetary stress factor added to the number. Additional modifiers are applied to rolls made in specific hexes. A DM + 2 is added if the hex is on a transverse plate boundary; DM + 2 is added if the hex is volcanic. If the final result is 32 + , there will be a seismic quake in that hex during that day.

The quake is a major one if a roll of less than or equal to the planet's stress factor is then made; otherwise the quake is considered minor.

A major quake has a magnitude of 2D − 2; a minor quake has a magnitude of 1D − 1. The magnitude of a quake determines the danger it represents to characters caught in it.

Quake Effects: Each character is "hit" by the quake if a roll on 2D of less than or equal to the quake magnitude is made against that character. A saving throw of dexterity or less is permitted to enable the character to avoid the hit; if the throw is failed, he will suffer damage. Quakes cause 2D damage.

Characters in structures or vehicles when a quake occurs must check for hits three times, rather than once. If they are undertaking some hazardous activity, the occurrence of the quake may be cause for even more danger (more rolls) at the referee's discretion.

Timing and Aftershocks: The referee is responsible for timing quakes. A random timing system might divide a day into six equal intervals, randomly chosen by 1D, and then go on to further subdivisions as needed.

A major quake will be followed by a number of "aftershocks" equal to the quake's magnitude, over a period of 2D hours following the initial quake. Again, timing is up to the referee. Minor quakes do not produce aftershocks.

Volcanic Eruptions: A volcano may be active or dormant. Roll 3D once per standard year; the volcano is active on a roll of the planetary stress factor or less.

An active volcano will be in an eruption period if a throw of 4D plus the world's stress factor is 32 + . This roll needs to be made only if a party is specifically visiting an area around a volcano. Notice also that if the stress factor is 7 − , volcanoes may be active yet never erupt. In this case, implement 1D − 1 minor quakes per day.

For each volcano in an eruption period, determine magnitude (2D − 2) and duration (2D − 2 × magnitude in standard days). In actual fact, the volcano will not be erupting constantly, but rather, displaying intermittent activity. Every 24 hours, roll 2D; a result less than or equal to the magnitude of the eruption indicates that the referee should consult the Eruption Activity Table, which yields results such as quakes, gas, ash and cinders, and lava flows. If the roll is greater than the magnitude, 1D − 1 minor quakes occur instead.

ERUPTION TABLE

Die	Eruption Activity
2-3	Lava flow, cinders & ash, 1D minor quakes
4-5	Gas cloud, 1D minor quakes
6-8	Cinders & Ash, 1D minor quakes
9-10	Cinders & Ash, gas cloud, 1D minor quakes
11-12	Lava flow, gas cloud, 1D minor quakes

Eruption Effects: Seismic quakes are handled as discussed above. Gas clouds taint the atmosphere for 2D + magnitude kilometers away from the volcano (the referee may designate a "downwind" direction); persons without filter masks will suffer 2D damage per hour in such gas clouds. Cinders and ash will rain down over a radius in kilometers equal to the eruption's magnitude. Over the course of several hours, cinders may accumulate to a depth of 1D × .3 meters. Unprotected individuals suffer 1 point of damage per combat round from exposure to this rain of hot ash.

Molten lava will flow from the mountainside at a steady, relentless speed of 5kph (S1 in **Traveller** terms), for a period of hours equal to the magnitude of the eruption. Lava does 3D damage per round to anyone caught in it. Protective gear may block or lessen such damage. Wheeled vehicles cannot maneuver on molten or recently hardened lava because of the heat effects on tires.

Predicting or Controlling Seismic Activity: Reliable quake prediction appears at tech level 8; warnings of imminent quake activity or volcanic eruptions may be available. At tech level 8 and above, whenever a quake is rolled, roll less than tech level on 2D to predict that quake. If the roll succeeds, delay implementation of the quake, and warn the characters that it will occur.

At tech level 10, controlling quakes is often possible. On a 3D roll for technology or less, the magnitude of a quake can be reduced by an amount equal to the tech level divided by 2 (round fractions down). The roll must be made individually for various quakes. A DM − 1 is allowed if the population of a city in the quake hex is 6 + .

—The Digest Group

The Prt'

The Prt' are a minor race evolved from once-domesticated carnivore/pouncers. They are bipedal, but can move on all fours at greater speed. Averaging about one meter in height and 25 to 30 kilograms in weight, their most distinguishing feature is a slight external resemblance to the *Felidae* (cats) of Terra, causing one observer to characterize them as "Over-grown tomcats".

The main differences between the Prt' and their wild forebears are a greater overall body size, an enlarged cranium, and the development of the forepaw into a stubby-fingered hand, allowing the manufacture and use of tools. The greatest difference of all is, of course, their sapience.

The Prt' (pronounced "Pert" with a rolled "r" and emphasis on the "t") inhabit a world in the Spica sector known to the inhabitants and to the Hivers (with whom the Prt' are affiliated) as Prt'aow. This word translates to mean "Home". Note: The pronunciation of this word is subtly different from the reference to one's dwelling, referring instead to the dwelling place of all clans.

The Imperial reference to this world is Spica/Prt' (C9667C9).

BACKGROUND

The Prt' were created by a race they refer to as the *Hasst'kor* (literally "those-who-came-before"). Known only through old legends, the Hasst'kor seem to have bio-engineered simple carnivore/pouncers for use as a servitor race, giving them manipulative ability and greater mentality. For an unknown period of time, this was the Prt' existence: servants.

Approximately −10000 Imperial, the Hasst'kor were destroyed in an interplanetary war with their neighbors. This catastrophe has eradicated the Hasst'kor and left the Prt' as the only intelligent life on the planet, their population drastically reduced by chemical assaults and the bio-plagues which destroyed their former masters.

The Prt' took to the wilds to avoid the major concentrations of the deadly chemicals and diseases. For millenia, they lived a brutish, primitive existence, slowly evolving their own

CONTACT

culture.

As time passed, a few scouts entered the devastated ruins of the former civilization. At first, those who dared to enter either never came out or died shortly thereafter of various diseases, remnants of the biological weapons.

Eventually, a few survived and returned. Because of the fact that those who entered the ruins often brought death back with them, they tended to be ostracized and treated as outcasts. With the passing of time, outcasts who did not die as result of their forays formed clans of their own. They moved into the ruins, where some examples of technology lay preserved in stockpiles and caches (the Hasst'kor were a cautious race, and had emergency stockpiles laid by in case of less devastating attack by their neighbors). These "civilized" clans prospered, advancing to TL-1 while the rest of the planet remained at TL-0.

Approximately −2400 Imperial, a Hiver expedition discovered the planet and its emerging race. Contacting a few recklessly curious clans, the Hivers had a rather typical reaction to primitives (for them, anyway), deciding that the Prt' needed uplifting to a civilized level. Soon, the Prt' were accompanying the Hivers on scouting expeditions through the stars. To this day, despite their somewhat violent ways, the Prt' remain very active in both Hiver exploration services.

Concerning the Hasst'kor: Hiver archaeological expeditions have yielded little knowledge on the original inhabitants of the system. It is clear that two planets, the third and the fourth, were occupied by sentient races. Those of the third were the Hasst'kor, a race of roughly Solomani size and shape. More of their physiology is not known—apparently they did not have a habit of portraying their form or likeness in art, at least not in a form which could survive the centuries; their anatomical/biological records also deteriorated long ago.

Their technology was roughly TL-9, but they had not discovered jump drives. Their bio-technology, however, evidently rated about TL-16; they were superb bio-technicians.
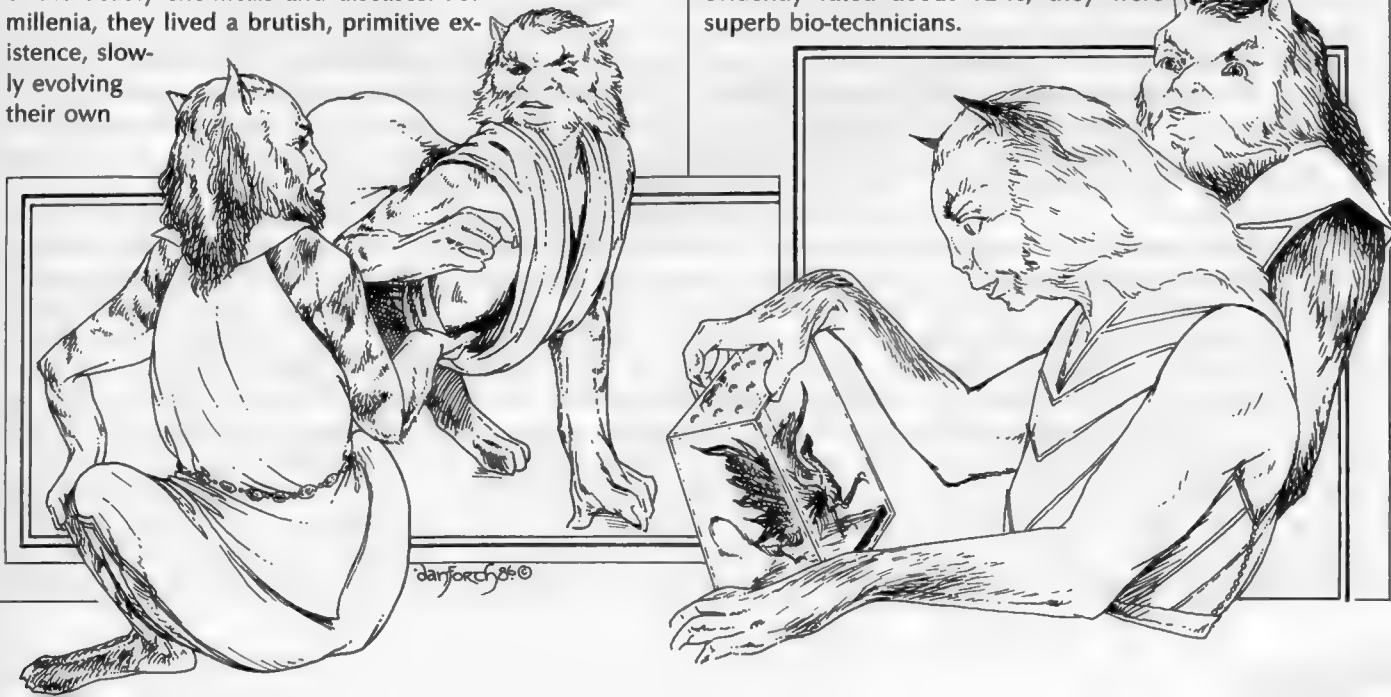
Of their mentality and philosophy, the only remaining demonstration is the condition of the fourth planet. Its surface is almost entirely stripped of life and pockmarked with huge craters. It is hypothesized that crude anti-matter ordnance was used. (Of the race which dwelt there, only the barest traces remain.)

SOCIETY

Prt' society is dominated by the clan system, similar to, although not as restrictive as Aslan clan hierarchy. Government is by a council of clan elders, who hold frequent meetings to decide policy for a population—a rather sporadic form of government. These elders also decide policy for their individual clans—male elders making most of the decisions, with final approval coming from the females. For the day-to-day paperwork that every functioning government had to deal with, there is a clan which specializes in bureaucracy and dealing with off-worlders (it is not a very large clan).

It should be noted that every surviving Prt' who reaches old age (60+ years) becomes an elder of his or her clan. Some Prt' are honored with the status of elder when they are as young as 40; usually this honor is bestowed for the performance of some great service to the race, or the amassing of popular or political power.

The armed forces of the planet are also clan-maintained, with the vast bulk being volunteer militia, formed from the very argumentative populace. The primary function of the armed forces, since space and interstellar defense is provided by the Hiver Confederation, seems to be frequent competition between clans to determine which unit is the most impressive. These wargames also serve for the Prt' equivalent of organized sports.

One other clan event of interest is the Kha'i (rite of passage), a ritual combat that marks the entry of a male Prt' into adulthood. Held bi-annually between clans, adolescent males compete against one another to prove their strength and suitability as mates—a function still served by this tradition, as many females have their selections influenced by the displays. Males not selected often leave their clans for a time to further prove their suitability by questing in unknown territory. With the entire planet explored, this often translates into starfaring. (Females coming of age also have the right to leave the clan, but few do so.)

INTERSTELLAR RELATIONS

Prt' is a member of the Hive Confederation, and Hiver influence is pervasive. (The written language of the Prt' is the Hiver idiographic system.) Although not one of the most influential members of the Confederation, the Prt' can boast of their contribution to the Hiver Exploration Service.

Their closest neighbors, the Solomani, retain friendly (if somewhat patronizing) relations with the Prt' government. On the whole, the Solomani are not favorites of the Prt', due to the Solomani characterization of the Prt' as large housecats.

Even though the Imperium is somewhat distant from Prt'aow, the Prt' are familiar with it, and many have gained Imperial citizenship through service in the Imperial Scout Service, a favorite among the Prt'.

Two entire clans of Prt' have moved to the Aslan Heirate, where they serve as assistants to Aslan corporations and clans, usually as interpreters in human-Aslan meetings. The Aslan appreciate the Prt' ability to tolerate human insults and gaffes without becoming mortally insulted (Prt' can still be considered "touchy" from a human standpoint, however). Occasionally, Prt' have served as mediators between Aslan clans, being recognized as neutral parties.

PLAYING THE PRT'

Three character traits are most prevalent in the Prt': curiosity, independence, and pride. The sometimes irrational urge for knowledge often gets Prt' in trouble, but it endeared them to the Hivers, who share similar urges. A Prt' character should be played intelligently, but always wanting to know what's happening, what's happened, and what lies ahead.

A Prt' is not likely to be tolerant of insults to his person or clan, with response ranging from return insult to violence, though those who have spent time among other races tend to be more willing to learn, realizing that their small size causes others to have trouble taking them seriously (often, females are less touchy than the males). Still, typical Prt' reaction to obvious insult tends toward a slap in the teeth (if they think they can get away with it!).

The Prt' love of independence counters much perceived clan authority. Although they still retain some responsibility to the clan, a Prt' sense of duty to clan and family exerts less pull with distance. Respect for authority other than clan/family is even less; Prt' have a tendency to ignore orders unless they want to obey them.

Other Salient Quirks: In mixed groups, Prt' males are rather protective of their females. Depending on the independence of the female(s) in question,

this protectiveness can be rather annoying. As noted before, they're a race of individuals. And finally, few Prt' appreciate the wasted effort of bureaucracy and red tape, generally perceiving it as a waste of their time and effort.

REFEREEING THE PRT'

Prt' characters are generated like regular **Traveller** characters, except that strength and endurance are rolled on 1D + 2 and dexterity is rolled on 2D – 2. Maximum Strength that can be attained is 10; maximum Endurance attainable is 11.

Dexterity is handled differently than usual: A Prt' is very agile, but the stubby fingers allow them only middling manual dexterity. In matters of delicate manipulation, such as weapons fire, the listed DEX score is used; when physical

ment in pirates, belters, rogues, hunters or barbarians; – 4 to any other unlisted service).

Aging rolls start at age 40, with a DM of + 1 on all rolls. Every two years after 40, aging rolls are conducted again.

Prt' may have any skill except equestrian (treat as hunting) and blade combat (treat as spring-claw skill below); they may, however, refuse to accept administration skill (unless mandatory) and roll again (if they get it on the second roll, they're stuck with it).

The Prt' must use specially modified weapons, and use human or Aslan weapons at – 3 DEX (and need both hands to do so). They prefer low-recoil weaponry, such as lasers and rocket weapons. The cost of the special modification ranges from + 25 to + 50%. Also, the modific...

three blades 12-15 cm long contained in a harness which covers the wrist and the back of the hand. Normally recessed into the harness, the blades spring out with great force to extend beyond the hand when triggered by the wearer (3D damage). Following this action, they are employed like normal claws, but with greater effect (treat as blade). Brawling skill is a DM for claw and Spring-Claw use, since the Prt' hand-to-hand combat can by no means be considered an art form (you get in close and buzz-saw the victim).

Weapon	Normal	Triggered
ARMOR		
Nothing	+3	+3
Jack	0	+1
Mesh	–3	–2

conscious) there should be an appropriate PS reward. Seconds gain 5 PS each.

Aftermath: Injured duelists receive medical treatment, which will restore 2D6 − 2 points of damage, and requires one hour. Additional treatment takes an hour per D6 − 1 points of damage recovered, and costs Cr100/hour.

If either party is killed the matter must be reported to the academy immediately. If this is done the survivor will be expelled, otherwise the survivor will be arrested, taken off-planet, and court martialed. The code used makes death unlikely.

When both parties are sufficiently recovered they can return to the academy. The roll to enter the academy without wounds being detected is the same as that needed to enter after a fight (see above), but is modified by circumstances (for example, if either party wears a bloodstained uniform).

Cadets caught duelling are liable to be expelled, but on a roll of 7+ (+1 per 5 points SOC, +1 per 50 points AS) this will be commuted to loss of privileges (permission to leave the academy grounds, and any posts of responsibility held) and the loss of 50+ (2D6x10) points AS. If one cadet is allowed to stay, both will be allowed to stay. Cadets seconding a duel are liable to loss of privileges and AS, to a lesser extent.

REFEREES' NOTES

The system used in this article is complex and requires some effort by the referee, since it involves 40 or more NPC's who must be followed through the academy year. Fortunately only a few will interact with the players in any given week. Many details can easily be handled by a computer program, and this may be advisable to speed play. It should be noted that this article has only dealt with a few details of academy life, and the referee should feel free to improvise other events and situations (from the literature referred to at the start of this article, or from other sources). For example, players or NPC cadets may wish to cause trouble for other cadets by informing the authorities of impending duels, rule infractions, and the like, and may attempt to lower their rival's PS by spreading rumors or gossip. Players may wish to form long-term relationships, marry (against academy rules), or engage in intrigue and espionage. It should be remembered at all times that NPC's are involved in similar activities to players, and may spoil their plans.

Weekly Cycle: This game proceeds on a weekly cycle, and players should be asked to give a rough outline of their intentions at the start of the week. The referee should discover how players intend to use free periods, and request details of any activities which may affect other players or NPC's. It may be advisable to take such information in writing without letting players see each others' notes.

NPC Activities: For each week of the campaign make the following die rolls for each NPC who is not indicated in the player's notes:

AS is modified by 2×(2D−7) points. For example, a roll of 4 indicates 2×(4−7) points, or −6 points. The NPC loses 6 AS points.

PS is modified by 2×(2D−7) points. For example, a roll of 9 indicates 2×(9−7) points, or 4 points. The NPC gains 4 PS points.

Roll 2D6 for unusual events. On a roll of 3-11 nothing happens, on 2 the NPC is involved in an activity which does not

affect the player character, on 12 the activity affects the characters.

If an unusual event is rolled, roll 2D6 and consult the following table. The effect on player characters is shown in brackets, and should be ignored if the previous die roll was 2.

UNUSUAL EVENTS

Die	Event
2-3	Duel (Challenge to PC)
4	Dinner Party (D6 PC's invited)
5-6	Practical Joke (on PC)
7	Returns to academy drunk (with PCs)
8-9	Insult another cadet (PC)
10	Cheating scandal (PC also accused)
11-12	Duel (PC asked to second)

Affected player characters may be selected randomly or by reference to their previous contact with the NPC. If this system is used the referee needs to keep a log of each NPC's action. If player characters are not involved in these activities the referee should work out which other cadets are involved. Referees may wish to play out the results of these events, by letting the players witness challenges and the result of NPC actions, or simply work out the new PS and AS levels and the resultant pecking order within the class.

At appropriate periods NPC's will be involved in examinations and sporting activities. The referee should roll the results of these activities randomly.

Once all NPC cadets' actions have been calculated, the total AS of the class should be compared with that of the previous week. Divide the difference by the number of cadets multiplied by 10. The resultant number is a modifier on the actions of staff and other NPC's, and is used as a DM when determining matters of expulsion, punishment, or reward. For example, if a class of 40 lose 50 AS in a week the DM is −50/40, or −1.25, which is rounded to −1.

The referee should determine the results of periods of detached duty for NPC's as well as player cadets.

If the referee wishes to reduce the size of classes it is easy to arrange a mass expulsion (a cheating scandal is good), a monorail crash, or some other convenient event. It is inadvisable to reduce class size below 15 NPC cadets plus the PC's in the first year, 12 plus players in the second, 10 plus players in years 3 and 4.

Ending the Game: If the game proceeds well it should be continued through the full term. At the end of the term all cadets either pass their examinations, and become officers (rank 01), or fail and revert to enlisted status for the subsequent term. In either event, the rest of the character's career may be determined by the normal routines in books 4-5.

Cadets (both players and NPC's) are free to leave the academy at any time and revert to non-commissioned status, to serve out the balance of a short term.

At time of war, and in response to other emergencies, cadets may be commissioned as officers (rank 01) and assigned to full-time service duties in an appropriate service branch. This is a convenient way of ending the game if time is short, with the balance of a character's service worked out by the normal game rules.

—Marcus L. Rowland

Emil "Boomer" Brankovich

Casual Encounter

Ex-Army Corporal C9D674, *Age:* 30, 3 terms, Cr10,000.

Army, three terms. Enlisted in Infantry, transferred to Commandos after first term.

Special Assignments: Commando School.

Awards and Decorations: Seven Combat Service ribbons, three MCUF, two MCGs, one purple heart.

Equipment Qualified On: ACR, Demolition, LAG.

Morale: 20

Skills: Brawling-3, Demolition-2, Combat Rifleman-2, LAG-2, Recon-1, Survival-1

Possessions: LAG, ACR

"Boomer" Brankovich is a big man; his nickname is variously said to have come from his love of explosives, his awesome right cross, or his stentorian voice. Any one of these reasons is apt enough.

At 30 years of age, Boomer is old for a corporal. Actually, he has been promoted to sergeant's rank four times, only to be busted again each time for offenses ranging from disobedience to a direct order to striking a superior officer. Though he is an exceedingly capable soldier, Brankovich has been a definite discipline problem, and this has hampered his progress in the military.

Brankovich mustered out of the service in company with an old comrade in arms, Sergeant Thomas Cordoba—usually known as "Sarge" among his friends. Boomer and Sarge have since become drifters, taking up odd jobs as mercenaries, bodyguards, or hired guns for a variety of employers. They are inseparable companions about whom it has been said (but out of Boomer's hearing) that "Sarge is the brains, and Boomer's the muscle."

Actually, Boomer is by no means stupid. He is, however, short-tempered and prone to blind, uncontrollable rages, particularly when injured, or when Sarge is endangered in some way. Given his immense strength, Boomer can be a serious problem under such circumstances, to friend—and those who happen to be with him—in danger when in the face of the enemy, and even friends have been known to feel his

wrath if they happen to be in his way during an outburst.

Boomer doesn't respond well to authority. He respects expertise and ability, and will obey orders from those he believes are competent to give them (such as Sarge). Suicidal orders tend to trigger his temper—hence some of his more spectacular service outbursts. An individual who can earn his respect will find that Boomer is a loyal and devoted friend for life.

Though highly competent with an ACR, Boomer's favorite weapon is, beyond a doubt, his LAG. One superior once commented that Boomer fired an LAG one-handed, like a pistol. He added that he wouldn't have been surprised to see the big man carrying an 8-inch howitzer instead of a rifle. Despite the hyperbole, it's true that Boomer prefers the LAG to other weapons, and has a habit of carving notches in the stock to record enemies dispatched by the weapon.

In an adventure, Boomer and Sarge make excellent hirelings, the sort of people who are perfect for a bit of fire support on a rough mission. They would be especially apt in adventures with a true military setting, but come in handy in almost any situation where firepower counts.

Though useful, these hirelings carry with them the seeds for all sorts of interesting complications in what might otherwise be a perfectly straightforward scenario. Brankovich's temper can get the player characters into a great deal of trouble. Most particularly, Boomer could be a serious problem if something happened to Sarge. If Sarge should be badly injured or captured, Boomer will perform acts of incredible endurance, strength, or valor to get him out of danger, regardless of the cost. He will also take a very dim view of anyone who considers Sarge expendable or who tries to separate the two of them (with a correspondingly favorable reaction to those who support him in his determination to help his friend).

Should Sarge be killed, Boomer's normally unstable personality will become wildly unpredictable. Characters who talk about Sarge, or otherwise remind Boomer of his loss, could easily wind up as notches on the LAG gunstock or a mass of bruised flesh from Brankovich's powerful fists. The corporal's ultimate fate will probably be a tragic one following the loss of Sarge, since he will take increasingly greater risks thereafter.

Boomer isn't only good as an NPC hireling. He is originally derived from a player-character who made such an impression that he soon entered playtest group folklore, reappearing as an NPC from time to time years after being retired by the original player. As a player character, Boomer can be a lot of fun. Players are encouraged to get into the role properly. The original version of Boomer was played largely through the use of a Reaction Table, which regulated his tendency to explode under proper provocation. Such a table can be easily constructed by interested players or referees, with a die roll being made every time the situation seems to warrant a possible adverse reaction by the big corporal. Done with consistency and style, this can encourage true role-playing in a game where players all to often tend to play idealized images of themselves.

Boomer and Sarge are, of course, a matched set, and stats for the Sergeant are provided below.

Thomas "Sarge" Cordoba

Ex-Army Gunnery Sergeant, 7A9A85, Age 34, 4 terms Cr6000
Army, four terms. Enlisted in Cavalry, transferred to Commandos after second term.

Special Assignments: Commando School, Protected Forces Training.

Awards and Decorations: Six combat service ribbons, two MCUF, one MCG, three purple hearts.

Equipment Qualified On: ACR, Grav Vehicle, Vacc Suit, VRF Gauss Gun.

Morale: 18

Skills: Combat Rifleman-2, Grav Vehicle-3, Instruction-1, Leader-1, Recon-1, Survival-1, Vacc Suit-1, VRF Gauss Gun-2.

Possessions: ACR   —J. Andrew Keith

assassinate or protect a particular guest at the resort, whose passion is wargaming. It may then become necessary to infiltrate the game to gain access to his command bunker.

To set up a game, the referee should give each side equal or roughly equal forces (not necessarily identical, but carefully balanced...for instance, one side might have a handful of spotter aircraft, while the other would balance this with light armor). Tech level is agreed upon, and the terrain chosen. The referee then defines the missions of each side; generally, each force will have both an offensive and a defensive objective, testing both ends of a commander's ability. Resolution is by the appropriate set of rules. If desired, though, almost any conventional wargame (such as GDW's Assault, as an example) can be adapted to use as a representation of the resort wargame.

Primarily interesting as a background diversion, this situation offers some interesting possibilities for introducing military operations into a **Traveller** campaign in an unusual and intriguing way.   —John Marshall

The Tuktaar Connection

The adventurers, a group of K'kree in a mercantile party, have come to Tuktaar (K'righeek 0710 C655AR(5)-F), a world near the edge of the Two Thousand Worlds near the Hiver-K'kree frontier. The party is engaged in ordinary trade and commerce, but soon after their cargo has been unloaded, receives an order to meet with the noble administrator responsible for regulation of commercial operations on the world. Accompanied by suitable retinues, the patriarchs of the families involved in the merchant group call on the noble.

This noble, Ghek'kurik, commences the meeting with brisk efficiency. In the past K'kaatu (about 70 standard days), several K'kree merchant vessels have been attacked, disabled, and boarded, their cargo holds ransacked and their entire crew and crew-family contingent killed. It is believed that human raiders are responsible for the incidents, but the local naval forces have been unable to catch these raiders in the act, so well-timed and carefully executed have these attacks been.

Humans are suspected for two reasons. First, one or two fragmentary transmissions from ships in distress have indicated that the vessels in question are very small (by K'kree standards), and of a basically human configuration. Secondly, the motive for the attacks seems to be an intent to hijack a particular type of cargo—!xug'k, which humans know as highleaf.

Highleaf is a mildly narcotic agricultural product popular to the luxury trade in K'kree space, about as stimulating to the K'kree system as a glass of wine is to humans. But this mild narcotic has a much stronger effect on humans who chew it, for it is one of the most potent drugs known to man, worth perhaps Cr25 per kg in the Two Thousand Worlds; it is worth up to Cr25,000 for the same size lots to human buyers in the Imperium and various nearby client states. It is extremely addictive and can be quite dangerous to humans if used too often or if improperly processed.

Each ship which was attacked carried a fairly large cargo of !xug'k, which was missing when the damaged vessels were checked out by naval patrols. The matter is a grave cause for concern; usually, human traders acquire such cargos in perfect legality (and what they do with them in human space, where highleaf is illegal, is their own business). Now, it seems that some unscrupulous human group has decided to prey on K'kree shipping. The massacre of crewmen, servants, even females and children, is enough to move any K'kree to rage.

So far, Ghek'kurik tells them, the navy has been unable to stop the raids. The attackers are too well organized, too capable of staging their ambushes quickly and competently to give the patrols a chance to close in. Ghek'kurik has decided that the obvious alternative is to set a trap. If the proper bait—an unusually large cargo of !xug'k—is available aboard an innocent merchant ship, perhaps the humans will pounce again. But, if the crew of the ship is ready, they are unlikely to be so successful. Ghek'kurik wants the group to carry out this special mission.

As is the case under most normal circumstances in the Two Thousand Worlds, the orders of an individual of higher caste must be obeyed. Nonetheless, the noble administrator does not wish to force the group to undertake such a hazardous job. He gives them the option of backing out, though he adds that they, being the only ship currently in port, are his best chance of catching these criminals before they can strike at another innocent party.

If the group accepts, Ghek'kurik will add some additional details. Every ship that has been ambushed has been taken in the Tuktaar system; each one has also been either coming from or bound to the Lalendriss system, which is the home of a subject race in the adjacent subsector, a jump-2 away from Tuktaar.

There is a distinct possibility that dissident elements on Lalendris (there are strong anti-K'kree movements there) are supplying information to the raiders. There are formalities to be gone though at either end of the route to import, export, or just tranship cargo through a subject starport, and it could be that word of ships carrying highleaf is passed on to the raiders. As to the raiders themselves, it can only be assumed that they are a single ship, perhaps operating from the Tuktaar planetoid belt. There have been a couple of noticeable gaps in the patterns of the raids, presumably when the ship was away to sell its ill-gotten cargo or to be serviced. Human traders have visited Lalendriss and Xikanookr several times of late, so either world (or both worlds) could have been giving support to the pirates without even realizing it.

Locating and destroying these raiders is a matter of paramount importance.

Referee's Information:

The actual situation is considerably more dangerous than any of the K'kree realize. It goes far beyond a piracy/smuggling ring.

In actual fact, the raiders are not humans at all. They are dissidents from Lalendriss who have obtained small, human-built starships. A group of humans is involved, but behind the scenes—they are arms merchants who are selling various weapons to the dissidents in exchange for highleaf. The dissidents are equipping themselves for an uprising against K'kree domination, which they hope will have the protection of the neighboring Hive Federation.

The humans are, in fact, based on a world of a Federation not far from Tuktaar, where they meet the raiders every so often to exchange weapons for highleaf out of reach of the K'kree navy. The Hivers are unaware of the situation, and would not condone it if they found out, but humans are common enough in the Federation and are pretty much free to come and go as they please.

The actual course of the adventure will be largely up to the referee. If the merchant K'kree go through the proper steps, notifying the Lalendriss representatives on Tuktaar to obtain cargo clearances prior to departure, they will be hit on their way to jump point. Resolve the attack by assuming 10 of the humanoid Lalendrians board the K'kree ship, in complete com-

bat armor and armed with laser rifles. The combat which follows should go in favor of the K'kree if they are prepared for the action.
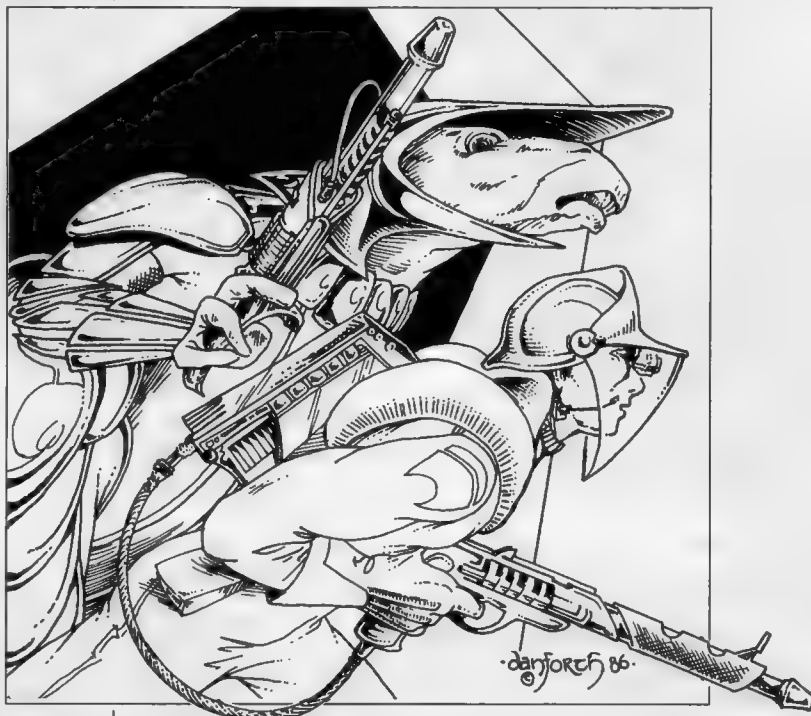
Once the boarders are defeated, there remains the ship. To take it, K'kree troops must overcome any enclosure problems (use the Reaction rules) and launch a boarding attack of their own; five more opponents, similarly armed, await them there.

Defeat of the initial Lalendrian attack will prove who was responsible for the raid, but it will take capture of the raiding ship and its captain to uncover details of the plot. It is fully possible that the referee may wish to follow up with additional adventures involving the smashing of the conspiracy and/or attempts to root out the humans who are behind the endeavor. Such further activities may be staged entirely at the referee's discretion. —*John Marshall*

SECTER FILE READER *CONTINUED FROM PAGE 29*

```
500 REM Sector File Reader
510 PRINT" This program reads a pre-generated sector file from
disk and holds it in the string array A$(R)."
1000 INPUT"Filename? ";FI$
1010 PRINT CHR$(4);"OPEN ";FI$;",L50"
1020 PRINT CHR$(4);"READ ";FI$;",R0"
1030 INPUT R
1040 DIM A$(R)
1050 FOR A=1 TO R
1060 PRINT CHR$(4);"READ ";FI$;",R";A
1070 INPUT A$(A)
1080 NEXT A
1090 PRINT CHR$(4);"CLOSE"
1100 FOR A=1 TO R
1110 PRINT A$(A)
1120 NEXT A
1130 END
```

Classifieds

CREDITS

Design..............Joe D. Fugate, Sr.
Development.....Timothy B. Brown
Art Direction..............Barbie Pratt
Interior Art..............Steve Venters

CREDIT WHERE IT'S DUE

Oops! Marc Miller, who hates to admit that the Workshop ever makes mistakes, confided in me that he made one recently. When he prepared the credits for Book 6, *Robots*, he neglected to include Gary Thomas as one of the designers. Design credit for *Robots* goes to Joe Fugate and Gary Thomas. While the error will be corrected in the next reprint, Marc felt it important to make a point of it now. Those of you who have *Robots* should pencil in Gary Thomas as co-designer on the credits page.   *Loren K. Wiseman, Editor*

Next Issue
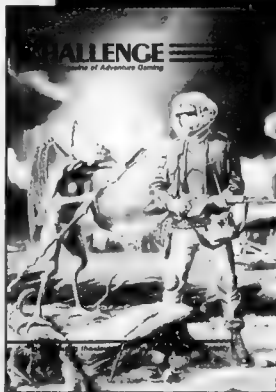
For *Traveller:*
  Grandfather's Worlds: An overview of Yaskoydray's hidden pocket universe, his technological wonders, and his secret outposts in Imperial and Vargr space.
  The Chosen: An in-depth look at a widespread (but not universal) Vargr notion of racial superiority.

For *Twilight: 2000:*
  Targets: Loren Wiseman gives you a rundown on the condition of the good ol' U.S.A.
  Invasion: Frank Chadwick details the Mexican invasion of the Southwest.